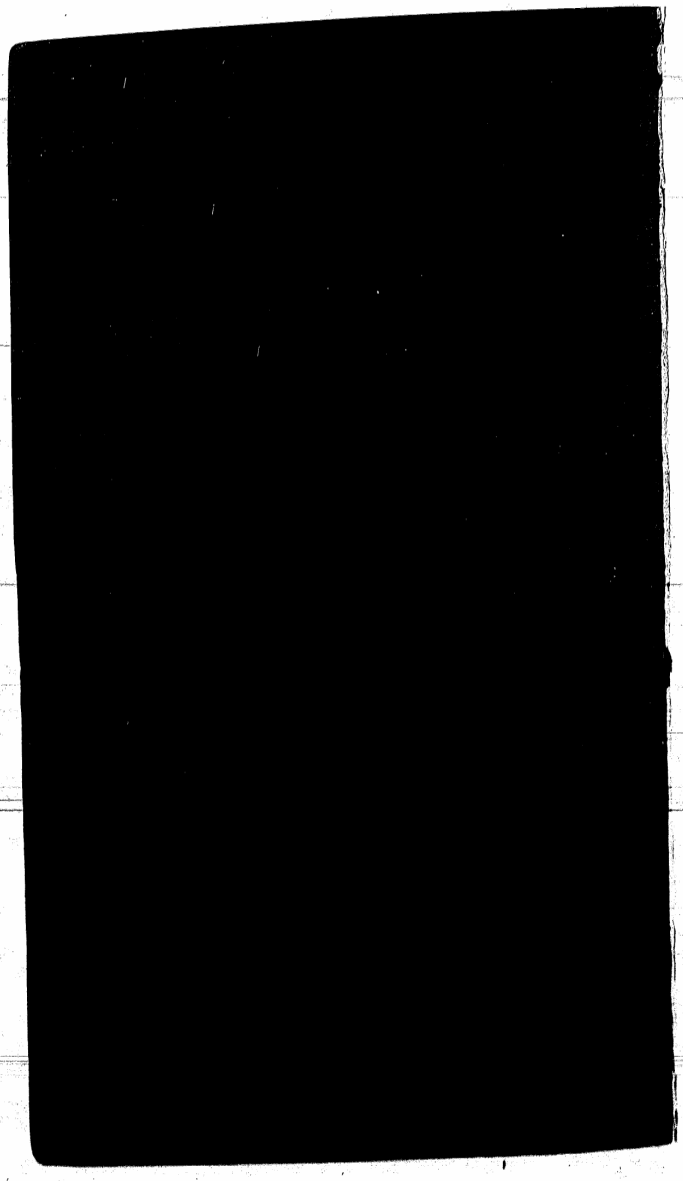


THE PRINCIPAL POINTS IN FAVOR OF THE

Edison-Lalande Battery.

1st. High and constant AVAILABLE electromotive force.

2nd. No local action, and, therefore, no loss of energy, while the cell is idle — the chemical action in cell is less than one per cent. per month

3rd. Extremely low internal resistance.

4th. Heavy current delivery, absolutely constant.

5th. Cheap materials easily obtained.

6th. No attention or inspection required until all the energy of its elements is exhausted.

7th. Convenience of form and freedom from noxious fumes or chemical deposits. No creeping.

8th. No polarization.

9th. Will not freeze at lowest temperature.

10th. The EDISON-LALANDE Battery is now made in ten different types, each one of which is especially designed for the kind of work named. (See page 6.)

Particular attention is directed to the Edison-Lalande cells, types V and Z, illustrated on page 13, as both these models have steel enameled jars, with liquid tight covers, and are specially suitable for use with portable gas engines, including marine and traction engines, etc., etc. Both types are strongly and well made, and will stand any amount of hard usage. They are also well adapted for PORTABLE *phonograph batteries.*

Description and Chemical Action of Cell.

The elements employed in the EDISON LALANDE cell are zinc, which forms the negative pole, and black oxide of copper (Cu. O), the positive pole of the battery. The exciting liquid is simply a solution of caustic potash. The oxide of copper is obtained by the process of roasting copper turnings; the oxide is then ground into a fine powder and compressed into solid blocks, from which plates of a suitable size for the different cells are cut. These plates are suspended from the cover of the containing vessel (a porcelain jar), in a grooved copper frame, the sides of which are rigidly bolted to the cover by means of thumb nuts, one of which also serves as the positive pole of the battery. On each side of the copper oxide element in the larger type cells (but only on one side in the smaller types) is suspended a rolled zinc plate. These zinc plates are fastened by a bolt to a knob on the cover. This prevents any movement in the relative position of the elements, and does away with the necessity of using vulcanite separators to prevent any short circuits occurring in the solution. The zincs are amalgamated, and as in most batteries the zinc is attacked more vigorously near the top than at the lower part of the plate, the zincs for this cell are made slightly tapering, the thick part being uppermost.

The exciting liquid employed in the battery consists, in all types of the 25 per cent solution of caustic potash in water, or in other words, of a solution of one pound of caustic potash in three pounds of water. When the circuit is closed and the cell is put in action, the water is decomposed, the oxygen combining with the zinc oxide of zinc which in turn combines with the potash to form an excessively soluble double salt of zinc and potash which dissolves in the exciting liquid, the hydrogen liberated by the decomposition of the water combining with the copper oxide to metallic copper. A layer of heavy petroleum oil is used on the solution to keep out the air and prevent creeping.

This battery has an initial E. M. F. of .95 volt, which drops to .7 volt on closed circuit. It is made in a variety of sizes, each adapted to a particular class of work. Taking the type "R" as a standard, this particular cell is 6 inches by 8 inches, the same size as the Western Union gravity battery. At first sight it appears that the E. M. F. is low. The internal resistance is, however, correspondingly lower (in this particular cell being only .043 ohm), and consequently it follows that the AVAILABLE E. M. F. (potential difference) is very high.

To take an instance; Two cells of six inches by eight inches gravity battery, when first set up, will have an E. M. F. of 2.158 volts, and an internal resistance of 1 ohm. Two cells of EDISON-LALANDE battery of type "R" will have an E. M. F. of 1.4 volts, and an internal resistance of .086 ohm. Suppose these two different batteries each work through a resistance of .1 ohm; the resulting current will be:

	E. M. F.	INT. RES.	EXT. RES.	TOTAL RES.	CURRENT.
Two cells gravity	2.158 volts	1 ohm	1 ohm	2 ohms	1.079 amperes
Two cells Edison-Lalande, type R	1.40 "	0.086 "	1 "	1.086 "	1.289 "

Furthermore, as is well known, the drop of E. M. F. across any particular resistance in a circuit, is proportional to the ratio of that resistance, to the total resistance of the circuit.

It follows, therefore, that the proportion of the E. M. F. absorbed by the internal resistance of the gravity battery is 50 per cent of the generated E. M. F., whereas in the EDISON-LALANDE battery the E. M. F. absorbed in like manner is 8 per cent. If the external resistance were less, the results would be still more in favor of the EDISON LALANDE. Again, in this case we have taken the gravity battery at its best, but on working this battery the internal resistance would constantly increase; which would absorb a corresponding proportion of the E. M. F., with a necessarily diminishing current in the external circuit. The internal resistance in the EDISON LALANDE cell, on the contrary, falls during the whole life of the battery, on account of the negative electrode, oxide of copper (which is a bad conductor), being continuously reduced, during the period that the circuit is closed, to metallic copper, which is a good conductor. This action virtually increases the size of the negative electrode thereby lowering the internal resistance.

One of the chief points of superiority of this battery is the absence of local action when not in actual service. In an actual test made with 40 of these cells by Dr. A. E. Kennelly at the time he was Chief Electrician at the Edison Laboratory, it was found that the average loss of zinc in each cell for a period extending over three months was a fraction over 1 per cent per month.

In making this test the zincs in each cell were most carefully weighed on *accurate balances* when the battery was first set up, and again at the end of each month, with the above result.

Still another good feature is that no attention is necessary until the charge is entirely exhausted, that there are no noxious or poisonous fumes, and that the permanent parts of the battery do not deteriorate with time, as is the case with other batteries. This battery is now extensively used for all closed circuit work requiring considerable current, and it gives universal satisfaction. It can also be equally well employed for open circuit work, such as burglar alarms, hotel annunciators, telephones, call bell circuits and railway crossing signals.

In order to point out the advantages and capabilities possessed by the different types of the EDISON LALANDE cell, which we manufacture, the table on the opposite page was prepared by Dr. A. E. Kennelly, when Chief Electrician of the Edison Laboratory, comparing these and other well-known batteries on the market. It should be remarked, however, that most of these latter, could not be practically employed for any motor work. The local action in the chromic acid type, and the polarization in the Leclanché, preclude their economic application for even very moderate deliveries of electric power. On the other hand, the EDISON LALANDE cell is free from objection on the score of either polarization or local action, and can be conveniently applied to sewing machine motors, fan motors, electric cauteries, gas engine igniters, small electric lamps and other purposes calling for moderate supplies of electrical power, in addition to the needs of telegraphy, telephony and electric bells or signals.

A careful scrutiny of the internal resistances (second column) of tabled and maximum safe continuous discharges (last column) of the various types of EDISON LALANDE cells, is most essential when selecting batteries for supplying heavy current for motor work, etc., as in such cases, the rate of discharge is the first thing to be considered, and is of far more importance than the capacity of the cell. For instance: The type "E" cell has a capacity of 50 ampere hours. It would not, however, be wise to employ a number of this type cell for operating a motor requiring 3 amperes to drive it; the maximum safe continuous discharge of this cell is found, by the table, to be only 1 ampere (see last column). It would, therefore, be advisable to use type R cell or any of the larger models for this work.

The remarks do not apply to cells used for battery work, which delivery upward of 30 amperes on short circuit; as in this case the current is used for only a few moments at a time and the battery can be used above the maximum rate of discharge as shown in the third column with good results.

Dr. A. E. Kennelly's table showing comparative efficiency tests between the various sizes of Edison Lalande cells, and other types of battery on the market, for purposes of driving small electric motors, or for moderate general delivery of power.

Name of Battery.	Mean Working Volts.	Average Internal Resistance Ohms.	Maximum Safe Continuous Delivery Current Amperes.	Capacity in Ampere Hours.	List Price.	Power Valuation.	Economic Power Valuation per $c.	Claimed Current Ampere
Edison Lalande Battery, Type E	1.8	0.40	4.50	68	$1.00	8.1	8.1	
Leclanché Carbon Bichromate Type	1.8	0.40	4.50	5	1.25	8.1	6.48	
Edison Lalande Cell	1.83	0.51	3.58	65	4.50	6.57	1.458	
Edison Lalande	1.4	0.8	1.75	45	2.50	2.45	0.98	
Leclanché Type	1.5 to 0.5	0.5	3.0		1.00	1.0	1.0	
Edison Lalande Type, Wooden Case, Open Circuit	1.0	0.5	2.0		0.90	2.0	2.22	
Edison Lalande.								
Type R, Portable Portable Air-tight	0.667	0.50	1.334	15	1.25	0.89	0.71	0.5
Annunciator Model	0.667	0.180	3.705	50	1.30	2.47	1.90	1.0
Universal Telephone Model	1.333	0.50	2.666	40	2.50	3.56	1.42	1.0
Small Fan Motor and Gas Engine Model	0.667	0.050	9.528	150	2.00	6.35	3.18	2.5
Liquid Tight Small Gas Engine Model	0.667	0.089	7.494	100	1.75	5.0	2.86	1.5
Liquid Tight Gas Engine Model	0.667	0.050	9.528	150	2.50	6.35	2.54	2.5
Gas Engine & R. R. Cross-ing Sema. Model	0.667	0.043	15.511	300	2.70	10.33	3.83	4.0
Fire Alarm Circuit Model	0.667	0.150	4.447	300	2.50	2.969	1.19	0.5
Telegraph and Fan Motor Model	0.667	0.025	26.680	300	2.85	17.78	6.24	6.0
Battery and Dental Motor Model	0.667	0.020	33.350	600	4.85	22.22	4.58	7.0

The currents that the cells will deliver when placed on short circuit. The last column gives the maximum current that can be advisably taken from the cells when worked continuously.

Advice as to which type of cell to use on various lines of work.

Each type of cell has been constructed to fill special requirements of the electrical profession. Thus we recommend their use as follows:

Type B. for Medical Induction Coils; see pages 15, 16 and 17.

Type J. for Telephone, Annunciator, Induction Coil, Medical Galvanic and Electric Bell work.

Type X. for Local and Long Distance Telephone.

Type Q. for Gas Engines, Small Fan Motors, Spark Coils, Large Annunciators and Burglar Alarms.

Type V (Liquid-Tight) for Marine and Traction Gas and Gasoline Engines and Portable Battery for Phonographs. (See page E.)

Type Z (Liquid-Tight) for Marine and Traction Gas and Gasoline Engines and Portable Battery for Phonographs. (See page E.)

Type R. for Gas Engines, Fan Motors, Phonographs, District Telegraph, Fire Alarm Telegraph, Local and Main Line Batteries, Turntable Motors, Electro plating, Railroad and Crossing Bell Signals.

Type Y. for Railroad and Crossing Bell Signals: **specially suitable for track circuit work**

Type S. for Fan Motors, Phonographs, Electro plating, Chemical Analysis, Miniature Lamps, Sewing Machines, X Ray Coils, Heiman Centrifuge, Railroad and Crossing Bell Signals.

Type W. For Cautery Batteries, Dental Motors, Small Power Motors, Sewing Machines, X-Ray Coils and Heiman Centrifuge

Read Carefully Before Setting up Batteries.

A Few Points to be Observed in the Installation and Care of EDISON-LALANDE BATTERIES.

Solution.

When Mixing Solution. Do not put the potash into the water or leave it to dissolve, as it will solidify at the bottom of the jar unless the fluid is stirred constantly **until the potash is entirely dissolved**

The solution will burn the skin and clothes. Care should be exercised when stirring, to avoid splashing it. If it is quickly removed from the skin by rubbing it off with a piece of tissue paper no inconvenience will follow. Any mineral or vegetable **not mineral** oil or grease will accomplish the same result, as it will saponify it and render it harmless.

The proportion of potash to water in making solution is 1 pound potash to 3 pints water for all types of cells, and the solution when first made should show a density of 1.25 specific gravity on the hydrometer at a temperature of 60 deg. Fahr. It should not be tested until it has cooled down to 80 deg. Fahr. when the solution is hot.

When the battery is charged it will show a density of 1.17 to 1.18 on the hydrometer. We recommend a normal hydrometer reading between 1.17 and 1.18 degrees.

The weight of potash and quantity of heavy paraffine oil used in each type of cell we make, are as follows:

Type A or B,	1 can	granulated potash,	weight	2½ oz.	to	8 oz. water,	1 oz. oil
" J or C,	1 "	"	"	8 oz.	to	24 oz. "	2 oz. "
" Q or E,	1 "	"	"	1 lb.	to	3 lbs. "	4 oz. "
" V,	1 "	"	"	1 lb.	to	3 lbs. "	4 oz. "
" Z,	1 "	"	"	11 oz.	to	2 lbs. "	2 oz. "
" S or K,	1 "	"	"	2 lbs.	to	6 lbs. "	4 oz. "
" R or G,	1 "	"	"	2 lbs.	to	6 lbs. "	6 oz. "
" Y,	1 "	"	"	2 lbs.	to	6 lbs. "	6 oz. "
" W or P,	1 "	"	"	4 lbs.	to	12 lbs. "	8 oz. "
" X or D,	2 bottles (one for each partition), each containing 5½ oz. potash to 16 oz. water in each partition, 2 oz. oil in each partition.						

The solution must always be renewed when the zincs and oxides are renewed, as it is then completely saturated with zinc oxide, which is held in solution, and is really changed into zincate of potash. If the old solution is not changed, but used over again, it finally becomes super-saturated with zinc oxide, which will solidify near the bottom of the cell in the form of needle-like crystals, and the efficiency of the battery will be greatly impaired.

The solution should always reach to the lower colored line in the jar after it has cooled down, and it may then probably be found necessary to add a little water when setting up the cell, to bring it to this line again, as the volume of solution diminishes and the density increases as it cools.

When these cells are used on outside work and ARE EXPOSED TO TEMPERATURES VARYING FROM FREEZING TO 40 DEGREES BELOW ZERO, it is advisable to use a 20 per cent. solution of caustic potash, as when a solution of this density is employed, the batteries will work much better in extreme cold weather, as the solution will not thicken in the least, whereas, when a 25 per cent. solution is used at these low temperatures, there is a tendency of the solution to partially jellify, which impairs the efficiency of the battery FOR THE TIME. The denser solution is, however, to be preferred for ordinary work, as the efficiency of the battery is somewhat higher when using a 25 per cent. solution in ordinary temperatures than when using a 20 per cent. solution. The following table gives the proportionate weights of potash and water for low temperature work, and it is advisable to always use this density of solution on Railway Signal Work, where the batteries are placed in exposed positions.

Type J or C,	1 can	potash,	weight	6 oz.	to	24 oz. water,	2 oz. oil
" Q or E,	1 "	"	"	12 oz.	to	3 lbs. "	4 oz. "
" V,	1 "	"	"	12 oz.	to	3 lbs. "	4 oz. "
" Z,	1 "	"	"	8 oz.	to	2 lbs. "	2 oz. "
" S or K,	1 "	"	"	1½ lbs.	to	6 lbs. "	4 oz. "
" R or G,	1 "	"	"	1½ lbs.	to	6 lbs. "	6 oz. "
" Y,	1 "	"	"	1½ lbs.	to	6 lbs. "	6 oz. "
" W or P,	1 "	"	"	3 lbs.	to	12 lbs. "	8 oz. "
" X or D,	each partition 4 oz. potash			to	1 lb.	"	2 oz. "

Paraffine Oil.

The oil used in this battery is a **very heavy pure mineral oil of high viscosity**. The object which this oil attains is not to prevent evaporation (although it also serves this purpose), but to prevent creeping of the solution up the zincs. If the oil is omitted, the zincs are rapidly attacked **above the solution,** by the potash extracting carbonic acid from the air and becoming carbonate of potash. This acts most destructively on the tops of the zinc plates, above the solution, which are finally reduced to the consistency of paste, and are totally disintegrated, although the part immersed in the solution remains intact.

The great importance of using the correct oil will thus be seen at once, as the ordinary heavy paraffine oils in the market have not sufficient **viscosity** to prevent this creeping. We should therefore strongly advise our customers to always order their oil from us, as we experimented for upwards of a year before we obtained a grade that we could absolutely rely upon. Do not stint the amount used. The layer of oil should be ⅜ inch deep on all cells.

Zincs.

The zincs used in all our cells, except type D or X will only last one charge of solution. At the end of this time they will be reduced to a skeleton. It is **important always to see that the necks of the zincs where they are bolted to the long binding-post bolt are clean and bright,** so as to insure good electrical contact; also see that the binding-post bolt and nut are perfectly clean and bright. For cleaning flat surfaces employ a small piece of emery paper, and the bolts themselves could be dipped into a dilute solution of sulphuric acid and water, as described more fully later on.

Copper Frames

When renewing the battery, it is desirable to clean the inside grooves of the copper frames where the copper oxide plates make contact, so as to ensure a good electrical connection. This is specially important where the batteries are required to give a heavy current for cautery or motor purposes. These frames can be easily cleaned by wrapping a small piece of emery paper round a stick which will just fit into the grooves, or by immersing them in a dilute solution of 1 part of sulphuric acid and 1 parts water, and then **carefully rinsing them in clean water,** to remove all traces of the acid.

Copper Oxide Plates.

These plates are made of compressed copper oxide, the surfaces of which are reduced by a special process, to metallic copper.

The amount of copper oxide used in each cell is so calculated that it will be entirely reduced to metallic copper when the zincs are consumed and the solution is exhausted.

TO ASCERTAIN IF THE OXIDE PLATES ARE EXHAUSTED: Pick into the body of the oxide plates with a sharp pointed knife. If they are red throughout the entire mass, they are completely exhausted and need renewing. If, on the contrary, there is a layer of black [illegible] the [illegible] plate there is still some life left, the amount being dependent [illegible] upon the thickness of the layer of black oxide still left.

IT IS VERY POOR ECONOMY TO USE EXHAUSTED OXIDE PLATES OVER AGAIN, as the battery will then polarize [illegible] [illegible] copper left to act as a depolarizer. [illegible] [illegible] should be remembered that the action of the cell [illegible]

Electro-Chemical Action of Battery.

When the circuit is closed, the water of the solution is decomposed into nascent oxygen and hydrogen. The oxygen goes to the zinc plate (the negative pole), and unites with it, forming oxide of zinc. This, in its turn, is dissolved by the potash solution, forming zincate of potash. The hydrogen goes to the oxide of copper plate (the positive pole), and unites with the oxygen in the oxide of copper, forming water (H_2O), leaving behind metallic copper. As the oxide plate is porous, this action goes on, when the battery is in service, until the oxide plate is reduced throughout its entire mass to metallic copper in a finely divided state, and there being no more oxide of copper left, the hydrogen will then collect in bubbles on the surface and in the interior of the plate, and polarization will ensue.

When the cells are only used over extended intervals of time (remaining idle during the balance of the time), it is advisable to keep them always on closed circuit through a high resistance, as there is a tendency of the solution to reoxidize the reduced copper surface of the oxide plates, and consequently just enough current should be taken from the battery to overcome this action. In practice it is found that a current of 15 milliamperes for types Q, R and S, and 25 milliamperes for type W is sufficient to accomplish this result. Our rheostats for cautery and dental work are all provided with these high resistance shunts, which are placed inside the rheostat box.

CAUTION. The oxide plates should never be removed from the potash solution and allowed to dry in the air, as, if this is done, the surface of the plates becomes reoxidized, by absorbing the oxygen from the air, and the oxide thus formed is much more difficult of reduction than the original oxide of which the plates are formed. The internal resistance is consequently very greatly increased, and the current materially diminished.

The difference of one inch in the height of the solution in the jars, determines the success or failure of these batteries.

Too great stress cannot be laid on the necessity of observing (when setting up the cells) that the **top of the oxide plate is fully one inch below the surface of the potash solution, and consequently about 1½ inches below the top of the oil.**

In some of the W jars it is just possible that the position of the two colored lines (referred to in the directions for setting up the cells) may be slightly lower than the standard distance from the top. It is therefore better, when setting up these cells (after the elements have been immersed in the solution), to raise the cover of each jar slightly, so as to ascertain the height of the solution above the top of the oxide plates, which can be noted by observing how far the insulating tube on the frame side are covered by the solution. If 1½ inches of the lower end of the tube is not covered by the **solution and oil,** add a little more water to bring it up to this position.

Note. When batteries are placed in warm places they should be examined every [illegible] or three months to see that the solution has not evaporated

as this will gradually take place, in spite of the oil, if they are in a hot room. If the solution is found to have evaporated, add more water to bring it again to the proper height.

THE IMPORTANCE OF KEEPING THE CELLS FILLED TO THE PROPER HEIGHT will be seen from the following explanation. The reduced surface of the copper oxide plate is covered with a fine dust of copper, particles of which become detached when the plate is put into the solution. These particles rise to the surface of the solution, and float underneath the layer of oil. If, therefore, the surface of the solution is only on a line with the top of the copper oxide plates these particles will in time form a bridge from the zincs to the oxide plate, and a short circuit will be established in the cell itself, which will destroy it and cause the zincs to eat off at the line of the solution.

One other point yet remains to be noted. It is of the first importance that all binding posts and connection wires should be kept clean and bright at the points of connection.

Table Showing Relation Between Old and New Models.

We have discontinued making Edison-Lalande cells, types A, C, D, E, F, G, K, L, M, N, P and T, and have substituted newer models specified below, and as listed on pages 11, 12, 13, 14 and 15. **We still keep on hand Renewal Parts for these earlier types** above referred to, so that customers having these cells in service will not be inconvenienced.

Old type	C	is now	represented	by	new type	J.
"	D	"	"	"	"	N.
"	E	"	"	"	"	Q.
"	G	"	"	"	"	R.
"	K	"	"	"	"	S.
"	P	"	"	"	"	W

The only change in these cells is that the zincs in the new types are bolted to a porcelain knob on the cover and consequently have a hole in the neck for the bolt to pass through, instead of being made with a hook, as in earlier models. The oxide plates, potash and oil, will do for the new and old types equally well.

Types A, F, L, M, N and T are not represented by new models, but are dropped altogether, as we found that the sizes we now make will fill all the requirements of the trade.

The following list will be of service to dealers carrying a line of our batteries on hand.

Oxide plates for	A & B cells	are the same size	
" "	C, J & X cells	"	
" "	E, F, K, L, Q, S & V cells	"	
" "	G, M, P, R, W & Y		
Potash cans, for	C, J & N		
	E, O, Q & V		
	G, R, K, L, S & Y		
	M, P & W		
Bottles of Oil for	C, J, N & Z		2 oz. per cell
	E, F, K, L, Q, S & V		4 "
	G, R & Y		6 "
	M, P, T & W		8 "

Zincs for each type of battery will have to be ordered for that particular type.

ALL PRICES SUBJECT TO CHANGE WITHOUT NOTICE.

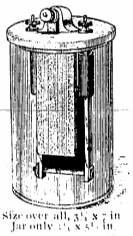
Price List

Edison-Lalande Batteries.

TYPE "J" CELL.

ANNUNCIATOR MODEL.

Capacity 50 Ampere-Hours.



Size over all, 3¼ x 7 in. Jar only [illegible] x 5½ in.

Price Complete Cell, with Porcelain Jar, $1.30

Price of Renewal Parts.

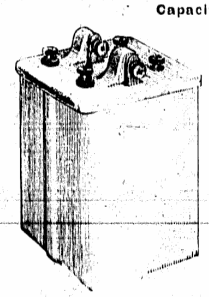
Copper Oxide Plate (capacity, 1 charge) .	$0.12
Zinc Plate (capacity, 1 charge), . . .	.08
Can containing 1 charge Caustic Potash, .	.12
Bottle Heavy Paraffine Oil, 1 charge, .	.05

For prices of permanent parts of cell see page 17.

TYPE "X" CELL.

SPECIAL TELEPHONE MODEL FOR LOCAL AND LONG DISTANCE TRANSMITTERS.

Capacity 40 Ampere-Hours.



Size over all [illegible] Jar only [illegible]

Price Complete Cell, with Porcelain Jar, - - - - - $2.50

The cell is made to fit battery box under transmitter.

Price of Renewal Parts.

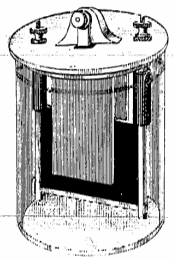
2 Copper Oxide Plates (capacity 1 charge), 12c. each, . . .	$0.24
2 Zinc Plates (capacity, 1 charge), 8c. each, . . .	.16
2 Bottles Caustic Potash (1 charge), 15c. each, . . .	.20
Bottle Heavy Paraffine Oil, 1 charge,	.05

For prices of permanent parts of cell see page [illegible]

TYPE "Q" CELL.

SMALL FAN MOTOR AND GAS ENGINE MODEL.

Capacity 150 Ampere-Hours.



Size over all 7 x 8 in
Jar only, 5½ x 6½ in

Price Complete Cell, with Porcelain Jar, - - - - - $2.00

Price of Renewal Parts.

2 Zinc Plates (capacity, 1 charge), 12c. each,	$0.24
1 Copper Oxide Plate (capacity, 1 charge),	.25
Can containing 1 charge Caustic Potash,	.17
Bottle Heavy Paraffine Oil, 1 charge,	.05

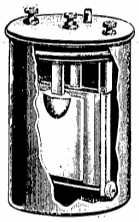
For prices of permanent parts of cell see page 17.

TYPE "Z" CELL.

SMALL MARINE AND TRACTION GAS ENGINE MODEL.

Liquid-Tight Steel Enameled Jar.

Capacity 100 Ampere-Hours.



Size over all 6½x6¼ in.
Jar only, 6¼ x 6 in.

Price, Complete, - - - $1.75

Price of Renewal Parts.

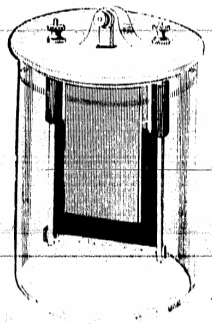
1 Copper Oxide Plate (capacity 1 charge),	$ .20
1 Zinc Plate, (capacity 1 charge),	.25
1 Can Caustic Potash (capacity 1 charge),	.15
Bottle Heavy Paraffine Oil (1 charge),	.05
Soft Rubber Gasket Rings, each,	.15

For prices of permanent parts of cell see page 17.

TYPE "R" CELL.

GAS ENGINE AND R. R. CROSSING SIGNAL MODEL

Capacity 300 Ampere-Hours.



Price Complete Cell, with Porcelain Jar, - - - $2.70

Price of Renewal Parts.

2 Zinc Plates (capacity, 1 charge), 21c. each,	$0.42
1 Copper Oxide Plate (capacity, 1 charge),	.40
Can containing 1 charge Caustic Potash,	.25
Bottle Heavy Paraffine Oil, 1 charge,	.05

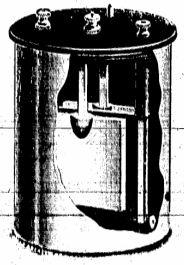
For prices of permanent parts of cell see page 17.

TYPE "V" CELL.

MARINE AND TRACTION GAS ENGINE MODEL.

Liquid-Tight Steel Enameled Jar.

Capacity 150 Ampere-Hours.



Size over all 7 x 8 in.
Jar only 5½ x 6½ in.

Price, Complete, - - $2.50

Price of Renewal Parts.

1 Copper Oxide Plate (capacity 1 charge),	$ .25
1 Zinc Plate (capacity 1 charge),	.40
1 Can Caustic Potash (capacity 1 charge),	.17
Bottle Heavy Paraffine Oil (1 charge),	.05
Soft Rubber Gasket Rings, each,	.15

For prices of permanent parts of cell see page 17.

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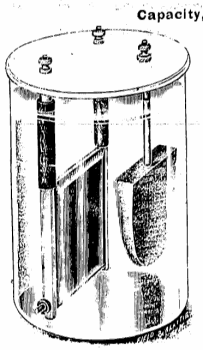
TYPE "Y" CELL.

TRACK-CIRCUIT AND CROSSING-BELL SIGNAL MODEL.

Capacity, 300 Ampere-Hours.



Size over all 6¼ x 9 in.
Jar only, 6½ x 8¾ in.

Price Complete Cell, with Porcelain Jar, - - - $2.50

Price of Renewal Parts.

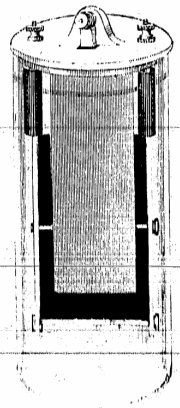
1 Zinc Plate (capacity 1 charge)	$ .30
1 Oxide Plate (capacity 1 charge), ...	.16
1 Can Caustic Potash (capacity 1 charge), ...	.28
1 Bottle Heavy Paraffine Oil (capacity 1 charge), . .	.05

For prices of permanent parts of cell see page 1

TYPE "S" CELL.

PHONOGRAPH AND FAN MOTOR MODEL.

Capacity, 300 Ampere-Hours.



Price Complete Cell, with Porcelain Jar, $2.85

Price of Renewal Parts.

2 Zinc Plates (capacity 1 charge), 31c. each,	$0.62
2 Copper Oxide Plates (capacity 1 charge), 25c. each, . .	.50
Can containing 1 charge Caustic Potash, ...	.28
Bottle Heavy Paraffine Oil, 1 charge,	.05

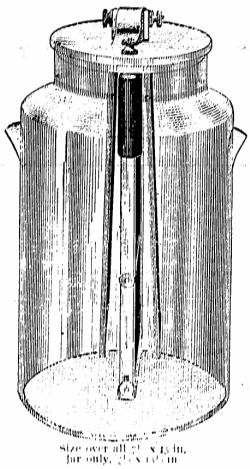
For prices of permanent parts of cell see page 1

15

TYPE "W" CELL.

CAUTERY AND DENTAL MOTOR MODEL.

Capacity, 600 Ampere-Hours.



Size over all 7¾ x 13 in.
Jar only, 7¼ x 12¾ in.

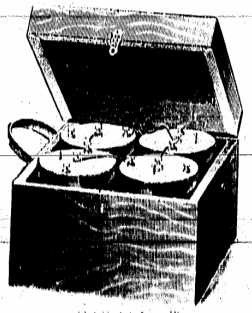
Price, Complete Cell with Porcelain Jar, - - - $4.85

Price of Renewal Parts.

2 Zinc Plates (capacity 1 charge), 38c. each, . .	$0.76
2 Copper Oxide Plates (capacity 1 charge), 46c. each,	.92
Can containing 1 charge Caustic Potash, ...	.52
Bottle Heavy Paraffine Oil, 1 charge, ...	.08

For prices of permanent parts of cell see page 17.

EDISON EXHIBITION PHONOGRAPH BATTERY.



Consisting of 4 Liquid-Tight Steel Cells, Type "V," capacity 150 ampere-hours, in polished oak case, with strap for carrying same.

Price, Complete, - $12.00

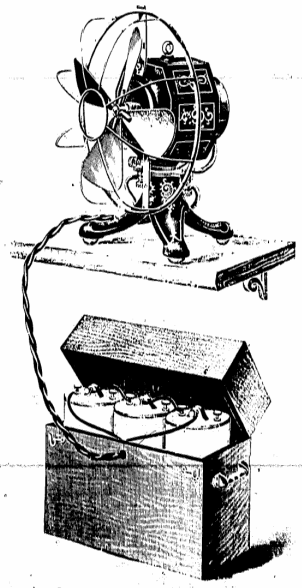
This battery will run the phonograph for 50 hours with single charge, and as it is absolutely liquid tight, it is specially recommended for travelling exhibition work.

Price of renewal parts for 4 "V" cells [illegible] page 130, **$3.08.**

Edison 7-in. Iron-Clad Fan Motor Battery Outfit, 1898 Model.

Consisting of Iron Clad Motor with 7 inch Fan and Guard, Battery Cords, three Edison Lalande cells, Porcelain Jars, type "S," in polished oak box 18¾ inches long, 8 inches wide, 15 inches deep.

Outfit Complete, with charge to run motor 150 hours, $17.50.



Edison Iron-Clad Battery Fan Motor, with 7-inch Fan and Guard, $8.50.

We wish, to call your special attention to the following advantages in this motor, which are possessed by none other in the market.

It is noiseless, has self-oiling bearings, and is entirely enclosed in iron clad case, the rear end being left open for the regulation of brushes. The workmanship is of the very highest grade.

When ordering renewals for this Outfit always state for Type "S."

Complete Renewals for 3 Cells, Type "S," $3.60.

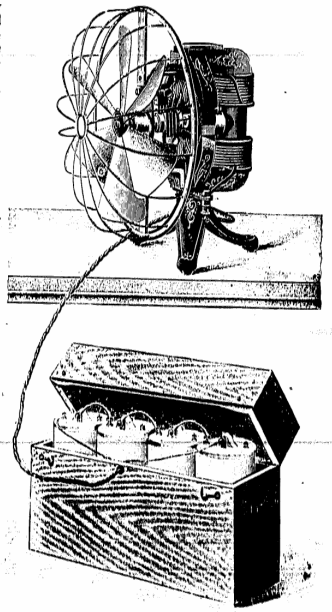
CONSISTING OF

6 Zinc Plates, Type "S."
6 Copper Oxide Plates, Type "S."
3 Cans Caustic Potash, single charges, Type "S."
Bottle Heavy Paraffine Oil, sufficient for 3 cells.
BRUSHES FOR IRONCLAD MOTOR EACH 50c.

Edison 9-inch Battery Fan Motor Outfit. 1898 Model. (Ball Bearing Motor.)

Consisting of Edison Battery Motor with 9-inch Fan and Guard, Battery Cords, 4 Edison-Lalande cells, type "S," Porcelain Jars in polished oak box, 25 inches long, 8 inches wide, 15 inches high

Outfit Complete, with charge to run motor upwards of 150 hours, $25.00.



Edison Battery Motor, with 9-inch Fan and Guard $12.00.

The motor belonging to this outfit is furnished with **ball bearings;** which materially decreases the frictional loss, and consequently the fan runs at a higher rate of speed while requiring considerably less current to drive it. **This improvement increases the efficiency of the motor nearly 50 per cent.**

The Motor with Fan occupies a space 10 x 12 inches. It is noiseless and the most efficient Battery Fan Motor on the market.

Flexible Battery Cord connecting Motor to Battery, $1.00

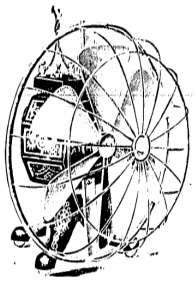
Complete Renewals for 4 Cells, Type "S," $4.76.

CONSISTING OF

8 Zinc Plates, Type "S."
8 Copper Oxide Plates, Type "S."
4 Cans Caustic Potash, single charge, Type "S."
Bottle Heavy Paraffine Oil, sufficient for 4 cells.
BRUSHES FOR EDISON 9 INCH MOTOR EACH 50c.

EDISON IRONCLAD 9-INCH FAN MOTOR.

(3 Speed)



FOR 110 TO 120 VOLT DIRECT CURRENT

Price Complete, - - - $12.00

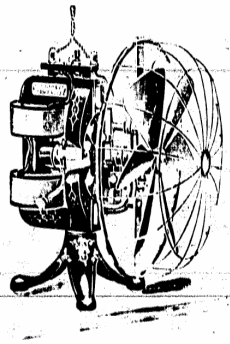
This motor is provided with a speed regulating switch to vary the velocity of the fan. The three speeds are as follows:

1100, 1600 and 1800 revolutions respectively.

It is furnished with self-oiling bearings, and is handsomely finished throughout.

EDISON 12-INCH FAN MOTOR.

(3 Speed)



FOR 110 TO 120 VOLT DIRECT CURRENT.

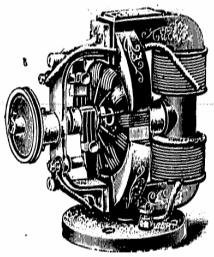
Price Complete, - - $17.50

This motor is provided with a switch for varying the speed of the fan. The three speeds are as follows: 900, 1100 and 1350 revolutions per minute respectively.

It is furnished with self-oiling bearings and the workmanship is of the highest grade.

Both these motors can be connected across the line (110 to 120 volt direct current) without any external resistance.

Edison Small Power Battery Motors.

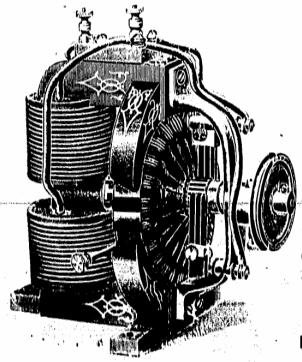


¼ Scale.

Edison Battery Motor No. 0.

This motor is suitable for Jewelers' and Dental lathes, where only small power is desired. It is furnished with ball bearings, and is of very high efficiency.

Price, - - $15.00.



¼ Scale.

Edison Battery Motor No. 00.

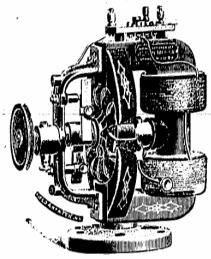
This motor is designed for heavier work, such as sewing machines, electric pianos, railroad semaphores, etc., and is also equipped with ball bearings.

Price, - - - $25.00.

The above motors, both of which are of the Paccinotti ring type, are of the very best construction, and are suitable for operating dental engines, jewelers' and dental lathes, sewing-machines, electric pianos, etc., etc. In designing them, special attention has been directed to produce motors of high efficiency, which is of far greater importance in battery motors than in small motors running on the light circuit, on account of the cost of the maintenance of the battery being reduced to a minimum when a motor of high economy is used.

Edison 1-12th H. P. Small Power Motor.

(3 Speed)

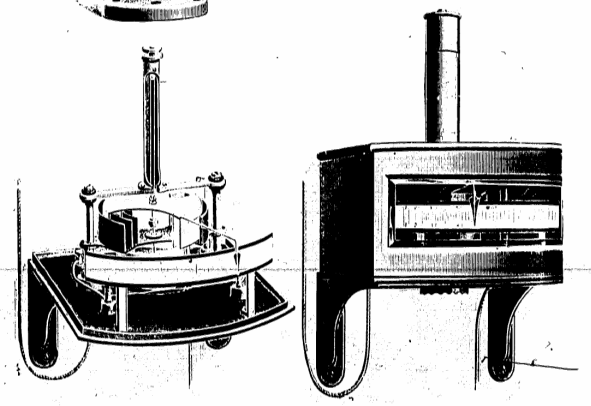


FOR 110 TO 120 VOLT DIRECT CURRENT

This motor is suitable for running small static machines, generators, kinetoscopes, dental and jewelers' lathes, and general laboratory work.

It is equipped with a speed-regulating switch for varying the speed of the motor

Price Complete, - - - $17.50



Kennelly Standard Static Voltmeter.

FOR HIGH TENSION CURRENTS, BOTH CONTINUOUS AND ALTERNATE

Scale, 0 to 600 Volts, - $40.00. Scale, 0 to 1200 Volts, - $40.00

This instrument is designed on the well known principle of the electrometer. Among the great advantages possessed by this instrument are the following:

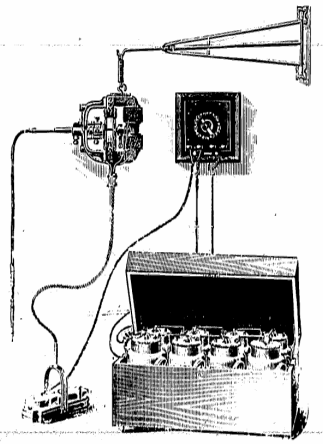
It consumes absolutely no current. It is not affected by dynamos.

It is easily calibrated and when once installed it never needs recalibrating.

The divisions in the scale are most open between the working limits. Various systems for which the instruments are designed, viz., between 100 volts on the 6 [illegible] instrument and between 800 and 1,200 volts on the 12 [illegible] instrument.

Edison Battery-Motor Dental Outfit.

OUTFIT "A."



CONSISTING OF

8 Edison-Lalande Cells, type "W," in lead lined, polished oak box.
Edison Reversing Suspension Motor with Coupling and Spring.
Reversing Foot-switch with Instantaneous Stop Attachment.
Combination Motor and Mallet Rheostat in oak case.
Battery leads connecting Battery to Rheostat.
Simonson Extension Wall Bracket.
S. S. White Flexible Arm with Duplex Spring, New Arm Support and either No. 6 or No. 7 Hand piece

PRICE COMPLETE, - - - $125.00.

Note If the S. S. White Flexible Arm, with duplex spring, new arm support and hand-piece is not required, it will make a reduction of $18.50 from the above prices.

When the cells can be conveniently placed in the cellar the oak box can be omitted, which will reduce the price of the outfit $10.00.

This outfit "A" has been before the profession for the last three years, and the large and increasing sale for it is sufficient acknowledgment of its worth. See testimonials on pages 24 and 25.

Prices of Separate Parts of Dental Outfit "A."

8 Edison Lalande cells, type "W," in lead-lined, polished oak box,	$ 48 80
8 " " " " " without lead lined, polished oak box,	38 80
Edison Reversing Suspension Motor, with coupling and spring,	17 00
Reversing Foot switch with instantaneous stop attachment and cords	20 00
Combination Motor and Mallet Rheostat,	12 00
Battery Leads (10 ft.) connecting battery to rheostat	2 00
Simonson Extension Wall Bracket,	10 00
S. S. White Flexible Arm with duplex spring, new arm support and either No. 6 or No. 7 hand piece,	18 50

TESTIMONIALS.

THE S. S. WHITE DENTAL MFG. CO., Chicago, Ill. CHICAGO, MAY 20TH, 1896.

GENTLEMEN:—I am pleased to say the Edison Lalande Batteries are [illegible] fact. They have now been in use about two years, and in that time [illegible] I using both my electric engine and pneumatic mallet with [illegible] when, except when needing to be recharged. They have [illegible] the two years of four charges including the charge when first put in use.

Respectfully, (Signed) [illegible]

S. S. WHITE DENTAL MFG. CO. PORCHESTER, N. Y., MAY [illegible], 1896.

GENTLEMEN:—The Edison Battery Outfit purchased from [illegible] and I would not be without it for [illegible] time and labor.

Yours very truly,

(Signed) [illegible]

S. S. WHITE DENTAL MFG. CO. [illegible], N. Y., [illegible], 1896.

GENTLEMEN:—I have used the Edison Battery outfit for nine months with the greatest satisfaction. [illegible] before it was necessary to recharge the battery.

Yours etc. (Signed) [illegible]

S. S. WHITE DENTAL MFG. CO. ANSONIA, N. Y., MAY 20TH, 1896.

GENTLEMEN:—In response to request for a testimonial as to the [illegible] same ever since the latest [illegible] obstacles. I bought all of [illegible] I have used it here over two months using [illegible] answer any questions that I can [illegible]

Very truly yours,

(Signed) H. [illegible]

S. S. WHITE DENTAL MFG. CO. NEW YORK, MAY 20TH, 1896.

Manager N. Y. Branch.

DEAR SIR:—The Edison Battery outfit [illegible] office in Troy, I [illegible] battery [illegible] setting them to [illegible] which [illegible] I am

Yours truly,

[illegible]

THE S. S. WHITE DENTAL MFG. CO. CALAIS, ME., May 2d, 1896.

DEAR SIRS:—I have one of your Edison Battery outfits and have had it since the 19th of last August. It has not been renewed yet and works as well as ever. It is a daisy. The only thing I regret is that I did not have it long before. It saves time to me and pain to my patients. As it runs so smooth and nice they all think it far ahead of a foot engine. I would not take a thousand dollars for it if I could not get another. In fact, if I had to give it up, I would give up dentistry. You can't say too much for it. I have answered more letters in regard to it and if they have all taken my advice you must have sold quite a number in the last six months. All I need now is a mallet to go with it to make earth a heaven for me as far as my work is concerned. Print anything you wish in regard to that machine, and I will endorse it.

(Signed) S. T. WHITNEY.

THE S. S. WHITE DENTAL MFG. CO., New York N. Y. LYONS, N. Y., April 27th, 1896.

DEAR SIRS.—My Edison Battery Outfit has been in constant use for a year and a half exactly, and I have always found it perfectly reliable and a pain saver to my patients, who much prefer it to the foot engine, and a labor saver to myself.

It certainly enables the operator to do his work with greater ease, both to himself and patient more satisfactorily and more rapidly. About eight months is the life of my battery when recharging is necessary, which anyone can easily do by following instructions.

Yours very truly, (Signed) H. E. FORRESTER, D. D. S.

THE S. S. WHITE DENTAL MFG. CO. TROY, April 24th, 1896.

GENTLEMEN.—Your letter asking my opinion of the Edison Battery Outfit was like a sermon reminding man that he is but mortal, and that there is an end to all earthly things. It was a rude waking from dreams of perpetual motion which often float before me while looking at my motor, and for the first time in six months I am reminded that I own a battery. My outfit was bought about twenty months ago and I am now on my third recharging. My power is far more steady, as well as more reliable, than any street system, and there is a decided satisfaction in being independent. I have not examined or even looked at my jars since charging them six months ago. My motor is in constant use, and it is working as well to day as the day they were charged. Do not disturb my dreams again by reminding me that I have not perpetual motion in the Edison outfit. It is so nearly so and the work of recharging so slight that I ask for nothing better.

Yours most truly,

(Signed) A. M. WRIGHT, M. D. S.

THE S. S. WHITE DENTAL MFG. CO. LAUREL, DEL., April 24th, 1896.

I am very glad to say that I have used the Edison Battery outfit constantly since July, 1894, with entire satisfaction to myself and patients it allowing me to operate more hours without fatigue and the patients appreciating the firm position the operator maintains, especially while excavating sensitive dentine. Respectfully,

(Signed) D. MARSHALL HITCH.

S. S. WHITE DENTAL MFG. CO. CHICAGO, ILL. PEORIA, ILL., April 24th, 1896.

GENTLEMEN.—I bought one of your Edison-Lalande Battery outfits in September, 1894, and have used it constantly ever since, running in addition to the motor, the electric mallet and hot-air syringe. After failure with two other primary batteries I am delighted with the success of this one, and should hate to keep house without it.

The only item of expense connected with it except for recharging it twice, has been twenty cents for a new pair of brushes. Respectfully, (Signed) W. A. JOHNSTON.

THE S. S. WHITE DENTAL MFG. CO. PHILA. PA. April 23d, 1896.

GENTLEMEN.—After having used the Edison Battery outfit for over two years I take great pleasure in stating that the service obtained has been at all times very efficient and reliable. During that period the battery has been recharged but once. February, 1895, and to day, after fourteen months service is in good condition and capable of running the Bonwill Mechanical Mallet as well as the drill. The battery is placed immediately before my chair, and is entirely free from fumes and its presence cannot be detected by sense of smell. As the power is so much quicker and stronger than the foot treadle engine it requires greater care in its use, but this is soon learned. If a brake could be applied to the motor, so that it could be stopped instantly, I believe the outfit would then be to the critical dentist quite near perfection. As a means of protection from dust etc. I think the motor should have a [illegible] of [illegible] using it.

Very truly yours, (Signed) F. HENRY NEAL

Prices of Separate Parts of Dental Outfit "A."

8 Edison Lalande cells, type "W," in lead-lined, polished oak box,	$ 48.80
8 " " " " " without lead-lined, polished oak box,	38.80
Edison Reversing Suspension Motor, with coupling and spring,	17.00
Reversing Foot-switch, with instantaneous stop attachment and cords,	20.00
Combination Motor and Mallet Rheostat,	12.00
Battery Leads (10 ft.) connecting battery to rheostat,	2.00
Simonson Extension Wall Bracket,	10 00
S. S. White Flexible Arm, with duplex spring, new arm support and either No. 6 or No. 7 hand-piece,	18 50

TESTIMONIALS.

CHICAGO, May 8th, 1896.

THE S. S. WHITE DENTAL MFG. CO., Chicago, Ill.

MESSRS :—I am pleased to say the Edison-Lalande Batteries are giving most excellent satisfaction. They have now been in use about two years, and in that time have given steady, constant current for using both my electric engine and pneumatic mallet, without ever having to touch them, except when needing to be recharged. They have been recharged three times in the two years or four charges including the charge when first purchased).

Repectfully (Signed) BYRON S. PALMER, D. D. S.
631 Washington Boulevard.

POUGHKEEPSIE, N. Y., May 9, 1896.

THE S. S. WHITE DENTAL MFG. CO.

GENTLEMEN :—The Edison Battery outfit purchased of you about two years ago has given *perfect* satisfaction in *every* respect, and I would not be without one a day, as it is a great economizer of time and labor

Yours very truly,
(signed) STEPHEN PALMER D. D. S

FREEHOLD, N. J., April 30th, 1896.

S. S. WHITE DENTAL MFG. CO.

I have used the Edison Battery outfit for nine months with the greatest possible satisfaction. I used it seven months before it was necessary to recharge the battery.

Yours, etc., (Signed) WM. E. TREES.

ASHLAND, NEB., May 4th, 1896.

THE S. S. WHITE DENTAL MFG. CO.

DEAR SIRS :—In response to request for a testimonial of the Edison Battery Outfit, would say that I have used the same ever since the first of last January, and it is still in good running order and gives perfect satisfaction. I bought it of your agent at Iowa City, Iowa. I used it in Iowa City two months and have used it here over two months, using the same plates I used in Iowa City. I will cheerfully answer any questions that I can concerning the value and advantages of the Outfit. I am Very truly yours,

(Signed) DR. H. L. HENRY

NEW YORK, May 2d, 1896.

THE S. S. WHITE DENTAL MFG. CO.

MR. E. HAMMSTAD, Manager N. Y. Branch.

MY DEAR SIR :—In relation to the Edison Battery outfit, will say that in April, 1895, I purchased of your house an outfit consisting of 8 cells Edison Lalande Battery, Rheostat, Switch, etc., using instead of the regular hand piece with motor connections, your foot and Weber Perry Suspension hand piece, setting the motor separate, using suspension engine belt. Will say that it gave me great satisfaction, doing everything required. I ran eight months before the Battery needed recharging (old Motor).

About two months ago I changed to the new motor and from experiments made since using Ampere Meter, I expect to get as much or more power and speed from eight cells as I did before from ten, and shall be very much disappointed if it does not run one year without recharging. The cells will run thirteen months from the experiments made as above, using eight cells as against eight months using ten cells (old Motor).

You may use any or all of the above as you see fit. Would be pleased to show the apparatus working if you should decide to call. Any one for that matter.

Most respectfully, Signed CHAS. F. SCOTT, Dentist.

CALAIS, ME., May 2d, 1896.

THE S. S. WHITE DENTAL MFG. CO

DEAR SIRS :—I have one of your Edison Battery outfits and have had it since the 9th of last August. It has not been renewed yet and works as well as ever. It is a daisy. The only thing I regret is that I did not have it long before. It saves time to me and pain to my patients. As it runs so smooth and nice they all think it far ahead of a foot engine. I would not take a thousand dollars for it if I could not get another. In fact, if I had to give it up, I would give up dentistry. You can't say too much for it. I have answered more letters in regard to it, and if they have all taken my advice you must have sold quite a number in the last six months. All I need now is a mallet to go with it to make earth a heaven for me as far as my work is concerned. Print anything you wish in regard to that machine, and I will endorse it.

(Signed) S. T. WHITNEY

LYONS, N. Y., April 25th, 1896.

THE S. S. WHITE DENTAL MFG. CO., New York, N. Y.

DEAR SIRS :—My Edison Battery Outfit has been in constant use for a year and a half exactly, and I have always found it perfectly reliable and a pain saver to my patients, who much prefer it to the foot engine, and a labor saver to myself.

It certainly enables the operator to do his work with greater ease, both to himself and patient more satisfactorily and more rapidly. About eight months is the life of my battery when recharging is necessary, which anyone can easily do by following instructions.

Yours very truly, (Signed) H. E. FORRESTER, D. D. S.

TROY, April 24th, 1896.

THE S. S. WHITE DENTAL MFG. CO.

GENTLEMEN :—Your letter asking my opinion of the Edison Battery outfit was like a sermon reminding man that he is but mortal, and that there is an end to all earthly things. It was a rude wakening from dreams of perpetual motion which often float before me while looking at my motor, and for the first time in six months I am reminded that I own a battery. My outfit was bought about twenty months ago and I am now on my third charging. My power is far more steady, as well as more reliable, than any street system and there is a decided satisfaction in being independent. I have not examined or even looked at my jars since charging them six months ago. My motor is in constant use, and it is working as well today as the day they were charged. Do not disturb my dreams again by reminding me that I have not perpetual motion in the Edison Outfit. It is so nearly so and the work of recharging so slight that I ask for nothing better.

Yours most truly,
(Signed) A. M. WRIGHT, M. D. S.

LAUREL, DEL., April 20th, 1896.

THE S. S. WHITE DENTAL MFG. CO

I am very glad to say that I have used the Edison Battery outfit constantly since July, 1894, with entire satisfaction to myself and patients, it allowing me to operate more hours without fatigue and the patients appreciating the firm position the operator maintains, especially while excavating sensitive dentine.

Respectfully,
(Signed) D. MARSHALL HITCH.

PEORIA, ILL., April 24th, 1896.

S. S. WHITE DENTAL MFG. CO., CHICAGO, ILL.

GENTLEMEN :—I bought one of your Edison-Lalande Battery Outfits in September, 1894, and have used it constantly ever since, running in addition to the motor, the electric mallet and hot-air syringe. After failure with two other primary batteries I am delighted with the success of this one, and should hate to keep house without it.

The only item of expense connected with it except for recharging it twice, has been twenty cents for a new pair of brushes.

Respectfully (Signed) W. A. JOHNSTON.

PHILA., PA., April 23d, 1896.

THE S. S. WHITE DENTAL MFG. CO.,

GENTLEMEN :—After having used the Edison Battery outfit for over two years, I take great pleasure in stating that the service obtained has been at all times very efficient and reliable. During that period the battery has been recharged but once, February, 1895, and to day, after fourteen months' service, is in good condition and capable of running the Bonwill Mechanical Mallet as well as the drill. The battery is placed immediately before my chair, and is entirely free from fumes, and its presence cannot be detected by sense of smell. As the power is so much quicker and stronger than the foot or gas engine, it requires greater care in its use, but this is soon learned. Had a belt could be applied to the motor, so that it could be stopped instantly, I believe the outfit would then be for the critical dentist quite near perfection. As a means of protection from dust etc. I think the motor should have a silk cover or hood including it.

Very truly yours (signed) F. HUNT, M. D.

The Edison Battery Motor Dental Outfit, Style "B."

This outfit "B" has been expressly designed to meet any objections that may be urged against the use of the suspension motor.

The special features of the apparatus are as follows:—

The battery consists of 8 cells of the well-known Edison-Lalande battery, type "W," which is universally used for battery dental outfits, on account of its long life, freedom from waste and absolute constancy of current.

The reversible motor is placed on the floor and mounted on an oak base, having a cover which fits entirely over it, to protect it from the dust, leaving only the pulley exposed. It is belted to the Gilbert adjustable bracket by a round cord belt similar to that used on the foot-engine.

The reversing foot-switch is fitted with forward and backward movement, and also instantaneous stop attachment, when the motor is running in either direction.

The rheostat is equipped with two sets of binding posts, one of them being for the motor connection and the other for attaching an electric plugger, mouth-lamp, hot-air syringe, or electro-cautery, as may be required, it being so constructed that it will regulate the current perfectly for all these various devices.

The Gilbert wall bracket has an adjustable movement, which enables it to be raised or lowered through an angle of 30 degrees, thereby avoiding the necessity of raising or lowering the chair. It has also an extension movement of about 12 inches which can further be used as a belt tightener. The upright socket at the end of this wall bracket is of the standard size, to enable any S. S. White engine-head to fit into it without alteration. The engine-head can therefore be removed at will from the foot-engine, and attached to the electric engine without a moment's delay.

This bracket is elegantly finished throughout in polished nickel, and is of handsome design.

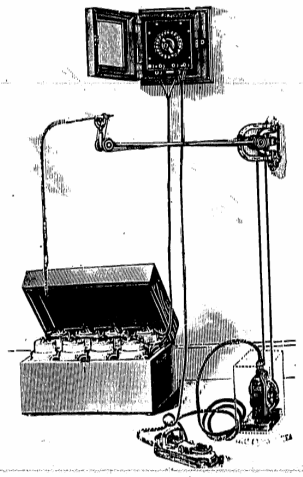
The S. S. White Engine-head, arm and hand piece are too widely known to need any description, as their excellence is universally attested

Prices of Separate Parts of "B" Dental Outfit.

8 Edison Lalande cells, Type "W," in lead lined polished oak box,	$18 80
" " without " "	28 80
Combination Motor and Mallet Rheostat, in oak case with glass cover,	17 00
" " " without " "	12 00
Reversing Motor, mounted on oak base, with polished oak cover,	30 00
Reversing Foot Switch with instantaneous stop attachment and cords,	20 00
Gilbert Wall Bracket with adjustable movement,	25 00
Battery Leads connecting Battery to Rheostat,	2 00
S. S. White Engine head, Flexible Arm with Duplex Spring, New Arm Support and either No. 6 or No. 7 hand piece,	24 00

The Edison Battery-Motor Dental Outfit.

STYLE "B."



CONSISTING OF

8 Edison-Lalande cells, type "W," in lead lined, polished oak box
Combination Motor and Mallet Rheostat in oak case with glass cover
Battery leads connecting Battery to Rheostat.
Reversing Motor mounted on oak base with polished oak cover.
Reversing Foot switch with instantaneous stop attachment
Gilbert Wall Bracket, with adjustable movement
S. S. White Engine-head, Flexible Arm with Duplex Spring, new Arm Support, and either No. 6 or No. 7 Hand piece

PRICE COMPLETE, - - - $105.00.

Price of outfit without the S. S. White Engine-head, Flexible arm with Duplex Spring, new Arm Support and Hand piece **$140.00.**

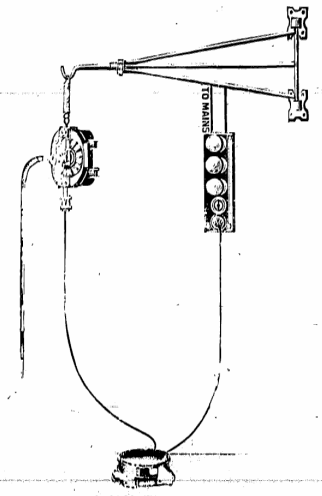
If the cells are placed in the cellar, the lead-lined oak box can be omitted, which will make a reduction of $10.00 from the above prices. The Rheostat can also be supplied without the case and glass cover, if required, which would make a further reduction of $5.00 from price of outfit

28

Edison Suspension Dental Outfit.

(For Use on 110 to 120 Volt Direct Current.)

OUTFIT "C."



CONSISTING OF

1 Edison Reversing Dental Suspension Motor "C" for 110 to 120 volt direct current with coupling and suspension spring.
1 Edison Combination Speed Regulating Rheostat and Foot-switch with instantaneous stop attachment and with lamp bank.
1 Simonson Extension Wall Bracket.
1 S. S. White Flexible Arm with Duplex Spring, new arm support and either No. 6 or No. 7 handpiece.

Price, Complete, - - - $80.00.

...PRICE OF PARTS SEPARATELY...

Edison Reversing Dental Suspension Motor "C" with Coupling and Suspension Spring	$21.50
Edison Combination speed regulating Rheostat and foot switch with lamp bank	30.00
Simonson Extension Wall Bracket	10.00
S. S. White Flexible Arm with Duplex Spring, new arm support and hand piece	18.50

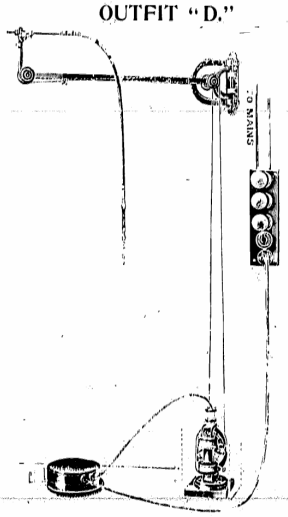
Dental Outfits C and D are Specially recommended to Dentists who can obtain the 110 volt direct current.

29

Edison Dental Outfit.

(For Use on 110 to 120 Volt Direct Current.)

OUTFIT "D."



CONSISTING OF

1 Edison Reversing Dental Motor "D," for 110 to 120 volt direct current with base and cover.
1 Edison Combination Speed Regulating Rheostat and foot-switch with instantaneous stop attachment, and with lamp bank.
1 Gilbert Wall Bracket with adjustable movement.
1 S. S. White Engine head, Flexible Arm with Duplex Spring, new arm support, and either No. 6 or No. 7 handpiece. **Price, Complete, $103.00.**

Price without S. S. White Engine head, Flexible Arm with Duplex Spring, new arm support and hand piece. **$80.00.**

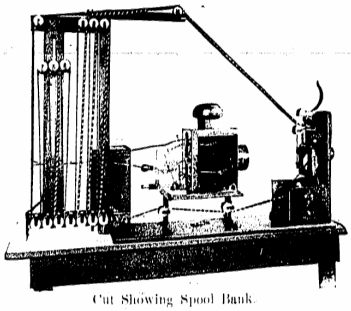
...PRICE OF PARTS SEPARATELY...

Edison Reversing Dental Motor "D," with base and cover	$28.00
Edison Combination Speed regulating Rheostat and Foot-switch with lamp bank	30.00
Gilbert Wall Bracket with adjustable movement	28.00
S. S. White Engine head, Flexible Arm with Duplex Spring, new arm support and hand piece	28.00

Dental Outfits C and D are specially recommended to Dentists who can obtain the 110 volt direct current.

The Edison Projecting Kinetoscope.

New Results, New Price, Life Pictures, Life Size.



Cut Showing Spool Bank.

. . . CONSISTING OF . . .

Projecting Kinetoscope with Spool Bank,

Condensing Lens, Objective Lens,

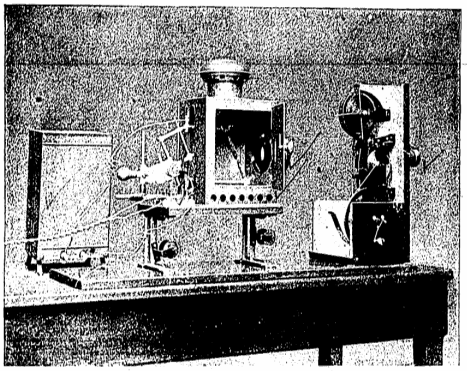
Electric Lamp, Lamp House and Resistance.

. Price, Complete, ... $75.00

A new projecting machine that accomplishes the results of the higher-priced machines, with equal accuracy and more brilliant effects. Compact—weighing only seventy-five pounds complete. Portable—packed in one case and can be shipped as baggage. Operated by hand power, and either 110 volt direct, or 52 or 104 volt alternating current used for lamp, about 25 amperes giving best results. Storage battery cannot be used, but other light than the electric can be applied if necessary. The pictures projected are life size, and the size of the projection on a screen, at a distance of fifty feet, is 11x13 feet. The outline of the pictures is sharp and clear, and Mr. Edison's new apparatus has almost entirely overcome the vibration, which heretofore has been the principal defect in projecting machines. Machines are sold outright, without territorial restrictions of any kind.

If electric current is not available we recommend calcium oxyhydrogen light. We can furnish a calcium light burner retort for $18.00 extra, and a complete outfit for generating gases, &c., for $128.

The machine is easily set up and operated. Every instrument is accompanied with full instructions and diagrams. The Projecting Kinetoscope, as shipped, is completely assembled for operation, ready to set on a table or other convenient base.



Cut Showing Reels.

Spool banks are furnished for this style of exhibit. Reels are also supplied, so that the film can be given, but one exposure should the exhibitor prefer, and several films can be joined together and run from a reel.

DIMENSIONS: When set up ready for operation, length, 3½ feet; width, 11 inches; height, with spool bank, 3½ feet; without spool bank, 2 feet.

Dimensions of packing case: 18 inches by 18 inches, by 28 inches.

Gross weight, 150 pounds.

. . . GENUINE EDISON FILMS . . .

Write for our new catalogue of more than 350 subjects.

PRICE { **$10 for 50 foot Films.** / **$20 " 100 "** / **$30 " 180 "**

SPECIAL NOTICE:

Our artists are now working in Japan and the far East. We shall shortly have ready for the market new and interesting subjects taken in the Orient.

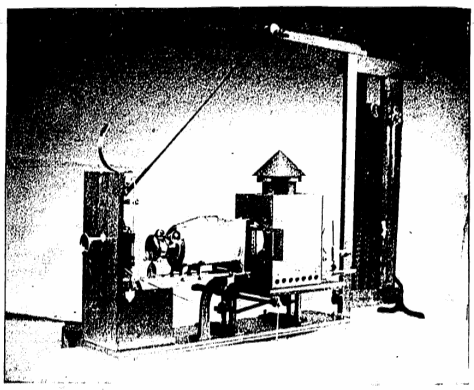
CAUTION!! Our Kinetoscopes, Projecting Kinetoscopes and Films are covered by U. S. Patents 493,426 dated March 14 1893 and 589,168 dated August 31 1897. The public is warned against purchasing or exhibiting apparatus of other make.

. . . Write for Special Catalogue of War Films . . .

...THE 1898 MODEL...

Edison Stereo-Projecting Kinetoscope.

Send for Descriptive Catalogue.



The Edison Projecting Kinetoscope with Stereopticon attachment, illustrated above, is complete with 2 objective lenses and 2 condensers, 1 lamp serving for both lenses. Electric, calcium or acetylene light can be used with good results.

Price of machine as per illustration and with Resistance Coil $100.00

Stereopticon Attachment alone and Instructions for converting Projecting Kinetoscope into a combined machine $25.00

...ANY ONE CAN MAKE THE CHANGE...

The machine is similar to the Edison Projecting Kinetoscope with the addition of the Stereopticon attachment, which can be used for illustrated songs and regular stereopticon views. The titles and a brief description of the items can be thrown on the screen, while the films are exhibiting, or to keep the attention of the audience while changing films.

Edison X-Ray Apparatus.

The value of the X-Ray in surgical diagnostic work, by which means the surgeon can directly examine, not only fractures, dislocations and malformations, but can also accurately locate any foreign substances that may have entered the body, has been recognized by the medical profession generally, and this apparatus is now considered an indispensable adjunct to every Hospital, Laboratory and operating room throughout the Country.

Where it is possible to obtain the 110 to 120 volt direct current, we most strongly recommend the Edison Instantaneous Air-Break-Wheel X-Ray Sets, which have been specially designed by Mr. Edison for use on this current, and which will produce far more powerful X-Ray effects than any other form of apparatus that is known up to the present time. Full particulars and prices of these sets will be found on pages 42 and 43.

The No. 400 and No. 500 X-Ray Sets are specially recommended for Hospital work and for the operating rooms of private physicians, as with either of these Sets, it is possible to obtain most excellent radiographs of any part of the body including the trunk and head, and the definition obtained with the fluoroscope is equally satisfactory.

The No. 600 and No. 700 X-Ray sets, are stronger than the smaller size Sets, and are specially constructed for parties requiring outfits with 10 in. and 12 in. Ruhmkorff Coils.

If it is impossible to obtain the 110 to 120 volt direct current, the Edison X-Ray Battery Sets, or Combination X-Ray and Cautery Sets should be used; as it is possible to obtain most satisfactory results with properly constructed battery apparatus. These outfits are listed on pages 39 to 41 inclusive. For general practice, the Combination Battery Sets No. 350 or No. 450 are specially recommended, as the price of these outfits is very little more than the Battery X-Ray Sets corresponding with same, and they have the additional advantage of enabling the Physician to use the battery part of the apparatus for electro Cautery work, running surgical motor, operating diagnostic lamps, and running the Heiman Centrifuge, listed on pages 55 to 58 inclusive.

Referring to Combination Sets No. 950 and No. 1050, both these outfits are extra powerful battery equipments, and are strongly recommended where coils giving a spark of 10 in. and 12 in. are desired.

We do not make any X-Ray apparatus to run on the alternating current, as it is necessary to use very complicated apparatus in order to secure satisfactory results, and consequently it is very difficult for persons who are not practical electricians to handle same. Furthermore, the results obtained with the best Alternating Current Apparatus, are not to be compared with those that can be produced with the Edison Instantaneous Air Brake-Wheel Sets, and in fact, are not equal to the Edison Battery Equipments.

We therefore, advise Intending purchasers of X-Ray apparatus who can only get the alternating current, to use Edison Battery X-Ray or Combination Sets, as they will find them much more simple in construction, easier to handle, and less liable to get out of order, besides giving more satisfactory work.

The essential features of the Edison Apparatus are enumerated below.

1 THE EDISON FOCUS TUBE.
2 THE EDISON FLUOROSCOPE.
3 THE EDISON RUHMKORFF COIL.
4 THE EDISON INSTANTANEOUS AIR BREAK-WHEEL APPARATUS FOR THE 110 VOLT CURRENT,
OR
THE EDISON LALANDE BATTERY.

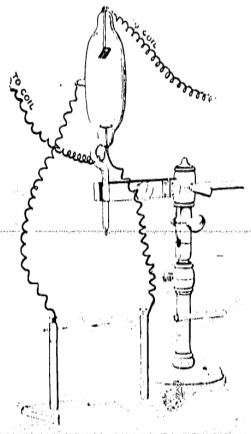
. . The Edison Focus Tube . .

These tubes, which are a modification of the vacuum tube devised by Sir Wm. Crookes, consist of an oblong glass tube having metal electrodes entering at each extremity, one of which is aluminum and is of circular concave form. This electrode is called the cathode. The other electrode facing it, is called the anode, and consists of a square piece of plantinum placed directly opposite the cathode, and at an angle of 45 degrees. The wires holding these electrodes are sealed into the glass at the point of entrance, and the tube is then exhausted of air, until a very high vacuum is obtained. It is found when using focus tubes, that the shadows are more sharply defined; and consequently the definition on the Fluoroscope is much clearer, and the time of exposure when making sciagraphs is also greatly shortened.

Our focus tubes are all made at the Edison Laboratory under the personal supervision of Mr. Thomas A. Edison, and are most carefully tested before being shipped.

When ordering focus tubes, it is advisable to state on what class of apparatus it is desired to use them, as a tube that would give excellent results on Break Wheel Sets, would not work satisfactorily on a Battery Set, on account of the vacuum not being right for that particular apparatus, and vice versa. Tubes with special vacuum are needed for static machine work.

It will therefore be seen how important it is that we should always know on what class of apparatus our tubes are to be used; as otherwise it is impossible for us to furnish tubes that are certain to work perfectly.

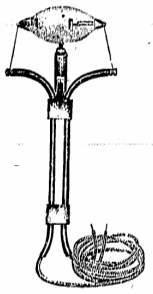


Edison Adjustable Focus Tube and Adjusting Stand.

The Edison focus tube with adjustable vacuum is the latest development in the line of focus tube and is specially recommended by us to all users of focus tubes. The accompanying cut shows the new adjustable vacuum tube connected to the spark gap adjuster.

The advantage which this tube possesses over that of the ordinary focus tube is that on shortening or lengthening the space between the spark rods of the adjuster, the vacuum in the tube can be lowered or raised at will. The prices of these tubes will be found on page 41.

The adjustable stand shown in the cut is so constructed that the tube can be used in any position either perpendicular, horizontal or angular. This wide movement will be found most convenient in cases where it is inconvenient to move the object under examination.



. . . The Edison . . .

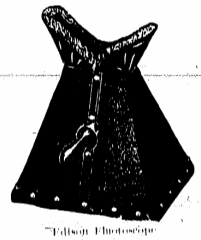
Portable Focus Tube Holder.

This device has been constructed to enable the X-Ray operator to move the focus tube a considerable distance from the Ruhmkorff Coil, and it will be found of the greatest assistance when making fluoroscopic examinations of patients who cannot be moved.

The flexible cord connecting the tube holder to the coil is several feet in length, and is covered with a composition having the most perfect insulating properties. For price see page 41

The Edison Fluoroscope.

This instrument is very similar in shape to the stereoscope, the body being of tapering form, with the small end formed to fit tightly over the eyes and the bridge of the nose; and the large end closed with a piece of cardboard, the inner surface of which is covered with a uniform layer of fine crystals of fluorescent material. This latter constitutes the fluorescent screen, and is the essential feature. This device enables the X-Rays to be practically utilized as one of the most powerful agents in surgical diagnosis.



Edison Fluoroscope.

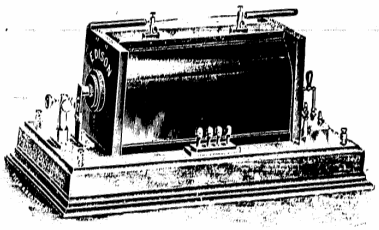
Fluorescent screens, mounted in suitable wooden framework, are also furnished by us.

When using the fluoroscope or the fluorescent screen, the object to be examined should be held between the screen and the electrified Crookes' tubes, when the radiographs of the object is delineated upon the screen.

The Edison Ruhmkorff Coil.

This instrument does not require any minute description, as its general characteristics are familiar to most people. Briefly speaking, it is a device for transforming a low tension current, into a current of very high tension.

In using this class of coil for X-Ray work, however, it is necessary to observe the greatest care in the construction of same, and also to accurately proportion the windings of the primary and secondary coils, in order to obtain the best results. In the Edison Ruhmkorff Coils, the greatest attention has been paid to the details, and also to the insulation of the primary coil from the secondary coil, as if there is any leakage, sparking ensues and the efficiency of the coil is destroyed.



The Edison Ruhmkorff Coil.

It is therefore necessary to use the very best quality of insulated wire and to test each section of the coil, as it is being built up, in order to produce an instrument that can be absolutely relied upon. We do not make our coils with sectional windings that can be detached singly, as experience has shown us that it is impossible to produce coils made in this way, which will not break down in time. All our coils are handsomely mounted on hollow mahogany bases, in the interior of which is placed a suitable condenser, which greatly intensifies the power of the coil. In the 4, 6, 8, 10 and 12-inch Coils, these condensers are made in sections, and are connected to a series of 4 plugs on the top of base, by which it is possible to use any portion or the whole of the condenser at will. It will be found when using both battery and break wheel sets, that some focus tubes will work better when only using a few sheets of the condenser, whereas other focus tubes require considerably more condenser, and in some cases it is necessary to plug it all in.

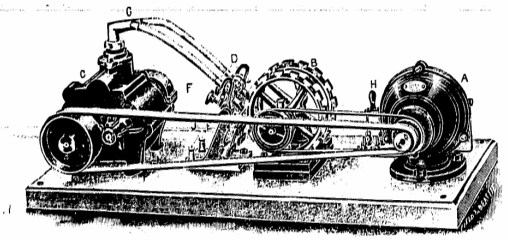
In order to plug in the condenser the plug should be inserted between the parallel flat brass strips in the hole provided for that purpose, whereas, if any of the condenser is not required to be used, that particular plug should be inserted in one of the four holes in the middle of the two brass strips. In the Break Wheel outfits it is sometimes possible to obtain better results when not using any condenser, and this will be found specially so when using new focus tubes; but in battery outfits it is always necessary to use one or more sections of the condenser to obtain satisfactory results.

The coils furnished with the battery sets are operated by a vibrator which is specially adjusted to which the periodicity of the vibration can be varied at will. A combined switch and push button is mounted on the other end of the coil for reversing the current and for operating the coil when desired.

Edison Instantaneous Air-Break-Wheel Apparatus.

In the coils used with the Edison Instantaneous air-break-wheel equipments operated by the 110 to 120-volt direct current, the vibrator is dispensed with, its place being taken by the instantaneous air-break.

This device consists of two tooth wheels mounted on the same shaft. The projections or teeth make contact with two flat brushes, which bear on the outer peripheries, and by which the current is brought in and led out again. These



Edison Instantaneous Air-Break-Wheel.

wheels are rotated at a very high speed by a small direct-current motor, which also runs a pressure-blower. The air blast from this blower enters a bifurcated tube and is conducted to two flat nozzles immediately over the contact brushes.

When the device is set in operation, by starting the motor and connecting the primary of the induction coil in series with the binding posts attached to the break-wheels provided for this purpose, the spark formed at the contact brushes, when the coil is energized, is instantaneously blown out by the air blast at the moment of formation. This greatly increases the rapidity of change in the magnetic circuit, and consequently vastly augments the electromotive force in the secondary coil.

The motor, break-wheel and pressure-blower are suitably mounted on a substantial hardwood base, provided with binding posts for connecting it with the 110 to 120-volt direct current.

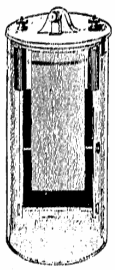
With the Edison Instantaneous air-break-wheel apparatus, the 110 to 120-volt direct current is employed to excite the primary coil and to run the motor. A suitable rheostat is provided to control the current passing through the coil, and all outfits are furnished with switch board having cut out, switches, and necessary wiring.

One great advantage of the Edison Instantaneous Air-Break-Wheel sets is that it is possible to use with these equipments, focus tubes of very high vacuum, which could not possibly be used with any other form of apparatus.

It is generally known that the higher the vacuum in the tube, the more penetrating and powerful is the X Ray, and consequently, it is advisable to use high vacuum tubes for body work, whereas, medium low vacuum tubes are suitable for hand work.

The Battery.

IN the battery X-Ray sets, it is necessary to excite the coil by means of a powerful battery, and the most suitable cell for this purpose is the Edison-Lalande cell, types "S" or "W." The great advantages of the Edison-Lalande battery over all others are that it will give a perfectly steady current during the whole time it is in use, and that there is no waste when the battery is idle. It also does not need any attention during its whole life, and it is very easy to renew when necessary.



Edison-Lalande Cell, Type "S"

With the battery X Ray sets we supply a number of these cells fitted into a lead lined polished oak box, together with the coil, the fluoroscope, Edison X-Ray focus tube, and adjustable stand, and the necessary wiring.

In the combination X-Ray and Cautery sets we also supply a suitable rheostat for controlling the current of the battery so as to allow of it being used for cautery, surgical motor, diagnostic lamp, and centrifuge work.

Where sets are required for use by traveling exhibitors, storage batteries may be used on account of their greater portability, but even in such cases it is an open question whether the Edison Lalande battery is not to be preferred, especially in foreign countries, as the difficulty experienced by the exhibitors in getting storage batteries charged, when they are at a distance from large cities, is frequently very exasperating. If, however, they are equipped with the Edison Lalande battery, all annoyance and pecuniary loss would be saved, as it would only be necessary to carry a few extra sets of renewal charges. In all cases where X-Ray sets are required for stationary use, the Edison Lalande battery is far ahead of the storage battery, and should always be used

Explicit directions (illustrated by diagrams) for setting-up all these various sets of apparatus, are sent out with each outfit, so that no technical knowledge is necessary to install and operate them

By far the best text book on practical X-Ray work, is that written by Dr. W. J. Morton, of New York City entitled, "The X Ray, or Photography of the Invisible" published by the American Technical Book Company No. 4 Vesey Street New York City. The style is clear and concise and the text is illustrated with a number of half tone illustrations giving fac simile copies of pictures taken from the negatives of the author. We keep a stock of these books on hand.

Price: Paper Cover 50 Cents; Cloth Cover 75 Cents

These Prices Supersede All Previous Quotations.

PRICE LIST OF

Edison X-Ray Battery Sets.

EDISON X-RAY BATTERY SET NO. 200, consisting of

1 Edison Ruhmkorff Coil, 4 in. Spark, with adjustable condenser and vibrator.
1 Edison Fluoroscope 5 in. x 7 in.
1 Edison X-Ray Focus tube, medium size.
1 Adjustable stand for tube.
8 Edison-Lalande Cells, Type "S" in metal lined polished oak box
1 Battery Cord to connect battery to Coil.
2 Insulated wires for connecting tube to Coil.

PRICE, COMPLETE, $125.00.

EDISON X-RAY BATTERY SET NO. 300. consisting of

1 Edison Ruhmkorff Coil, 6 in. Spark, with adjustable condenser and vibrator.
1 Edison Fluoroscope, 6 x 8 in.
1 Edison X-Ray Focus tube, medium size.
1 Edison X Ray Focus tube, large size.
1 Adjustable stand for tube
12 Edison Lalande Cells, type "S" in metal lined polished oak box.
1 Sliding Adjustable Rheostat to vary current in primary of Coil.
1 Battery Cord to connect Battery to Rheostat and Coil.
2 Insulated wires for connecting tube to Coil.

PRICE, COMPLETE, $170.00.

SPECIAL NOTICE.

All Genuine Edison Coils have the name "Edison" Engraved on them

PRICE LIST OF

Edison X-Ray Combination Battery Sets

— FOR —

X-RAY, CAUTERY, SURGICAL MOTOR, DIAGNOSTIC LAMP AND CENTRIFUGE WORK.

EDISON COMBINATION BATTERY SET No. 250, consisting of

1 Edison Ruhmkorff Coil, 4 in. spark, with adjustable condenser and vibrator
1 Edison Fluoroscope, 5 in. x 7 in.
1 Edison X-Ray Focus tube, medium size.
1 Adjustable stand for tube.
8 Edison-Lalande cells, type "W," in metal lined polished oak box.
1 Combination Rheostat, for using battery for X ray, cautery, motor, diagnostic lamp and centrifuge work.
1 Battery Cord connecting Combination Rheostat to coil.
1 Battery Cord connecting Battery to Combination Rheostat.
2 Insulated wires for connecting tube to coil.

PRICE, COMPLETE, - $155.00.

EDISON COMBINATION BATTERY SET No. 350, consisting of

1 Edison Ruhmkorff Coil, 6 in. spark, with adjustable condenser and vibrator.
1 Edison Fluoroscope, 6 in. x 8 in.
1 Edison X-Ray Focus tube, medium size.
1 Edison X-Ray Focus tube, large size.
1 Adjustable stand for tube.
10 Edison-Lalande cells, type "W," in metal lined polished oak box.
1 Combination Rheostat, for using battery for X-ray, cautery, motor, diagnostic lamp and centrifuge work.
1 Battery Cord connecting Combination Rheostat to coil.
1 Battery Cord connecting Battery to Combination Rheostat
2 Insulated wires for connecting tube to coil.

PRICE, COMPLETE, - $200.00.

SPECIAL NOTICE.

All Genuine Edison Coils have the name "Edison" Engraved on them.

PRICE LIST OF

Edison X-Ray Combination Battery Sets

— FOR —

X-RAY, CAUTERY, SURGICAL MOTOR, DIAGNOSTIC LAMP AND CENTRIFUGE WORK.

(CONTINUED)

EDISON COMBINATION BATTERY SET, No. 850, consisting of

1 Edison Ruhmkorff Coil 8 in. spark, with adjustable condenser and vibrator.
1 Edison Fluoroscope 8 in. x 10 in.
1 Edison X Ray Focus tube, medium size
1 Edison X Ray Focus tube, large size.
1 Adjustable stand for tube.
12 Edison Lalande Cells, type "W," in metal lined polished oak box.
1 Combination Rheostat for using Battery for X-Ray Cautery, Motor, Diagnostic Lamp and Centrifuge work
1 Battery Cord connecting combination Rheostat to coil
1 Battery Cord connecting Battery to combination Rheostat
2 Insulated wires for connecting tube to coil

PRICE, COMPLETE, $265.00.

EDISON COMBINATION BATTERY SET No. 950, consisting of

1 Edison Ruhmkorff Coil 10 in spark, with adjustable condenser and vibrator.
1 Edison Fluoroscope 8 in. x 10 in.
1 Edison X Ray Focus tube, medium size.
1 Edison X Ray Focus tube, large size.
1 Adjustable stand for tube.
16 Edison-Lalande cells, type "W," in two metal lined polished oak boxes
1 Combination Rheostat for using Battery for X Ray, Cautery, Motor, Diagnostic Lamp and Centrifuge work,
1 Battery Cord to connect Combination Rheostat to coil.
1 Battery Cord to connect Battery to Combination Rheostat
2 Insulated wires for connecting tube to coil.

PRICE, COMPLETE, $310.00.

EDISON COMBINATION BATTERY SET No. 1050, consisting of

1 Edison Ruhmkorff Coil 12 in. spark with adjustable condenser and vibrator.
1 Edison Fluoroscope 8 in. x 10 in.
1 Edison X Ray Focus tube, medium size.
1 Edison X Ray Focus tube, large size
1 Adjustable stand for tube.
20 Edison Lalande Cells, type "W," in two metal lined polished oak boxes.
1 Combination Rheostat for using Battery for X Ray Cautery, Motor, Diagnostic Lamp and Centrifuge work.
1 Battery Cord connecting Combination Rheostat to coil.
1 Battery Cord connecting Battery to Combination Rheostat.
2 Insulated wires for connecting tube to coil.

PRICE, COMPLETE, $350.00.

SPECIAL NOTICE.

All Genuine Edison Coils have the Name "Edison" Engraved on them.

PRICE LIST OF

Edison Instantaneous Air-Break-Wheel X-Ray Apparatus.

(For use on 110 to 120 Volt direct Current only.)

EDISON X-RAY SET No. 400. consisting of

1 Edison Ruhmkorff Coil, 6 in. Spark, with adjustable condenser, without vibrator.
1 Direct-Current Motor, with instantaneous air-break-wheel, and pressure blower, mounted on hardwood base.
1 Switch board with Snap Switch, branch cut-out, necessary wiring, etc.
1 Regulating Rheostat, for coil.
1 Edison X-Ray Focus Tube, medium size.
1 " " " " large "
1 Adjustable Stand, for same.
1 Edison Fluoroscope, 6 in. x 8 in.
2 Wires for connecting tube to coil.

PRICE, COMPLETE, - $250.00.

EDISON X-RAY SET No. 500. consisting of

1 Edison Ruhmkorff Coil, 8 in. spark, with adjustable condenser, without vibrator.
1 Direct-Current Motor, with instantaneous air-break-wheel, and pressure blower, mounted on hardwood base.
1 Switch-board with Snap Switch, branch cut out, necessary wiring, etc.
1 Regulating Rheostat, for coil.
1 Edison X-Ray Focus Tube, medium size.
1 " " " " large "
1 Adjustable Stand, for same.
1 Edison Fluoroscope, 8 in. x 10 in.
2 Wires for connecting tube to coil.

PRICE, COMPLETE. - $285.00.

Brushes for Break-Wheel, per pair, 10c.

SPECIAL NOTICE.

All genuine Edison Coils have the name "Edison" Engraved on them.

PRICE LIST OF

Edison Instantaneous Air-Break-Wheel X-Ray Apparatus.

(CONTINUED)

(For Use on 110 to 120 Volt Direct Current Only.)

EDISON X-RAY SET No. 600. consisting of

1 Edison Ruhmkorff Coil, 10 in. spark, with adjustable condenser, without vibrator.
1 Direct-Current Motor, with instantaneous air break wheel, and pressure blower, mounted on hardwood base.
1 Switch-board with Snap Switch, branch cut out, necessary wiring, etc
1 Regulating Rheostat, for coil.
1 Edison X-Ray Focus Tube, medium size.
1 " " " " large "
1 Adjustable Stand, for same.
1 Edison Fluoroscope, 8 in x 10 in.
2 Wires for connecting Tube to Coil.

PRICE, COMPLETE. - $315.00.

EDISON X-RAY SET No. 700. consisting of

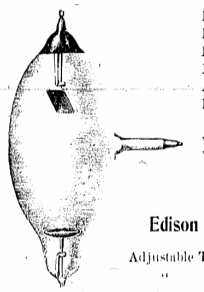
1 Edison Ruhmkorff Coil, 12 in. spark, with adjustable condenser without vibrator.
1 Direct Current Motor, with instantaneous air break wheel, and pressure blower, mounted on hardwood base.
1 Switch-board with Snap Switch, branch cut out, necessary wiring, etc.
1 Regulating Rheostat, for coil.
1 Edison X Ray Focus Tube, medium size.
1 " " " " large "
1 Adjustable Stand, for same.
1 Edison Fluoroscope, 8 in. x 10 in.
2 Wires for connecting Tube to Coil

PRICE, COMPLETE. - $350.00.

SPECIAL NOTICE.

All genuine Edison Coils have the name "Edison" Engraved on them.

Edison X-Ray Focus Tubes.

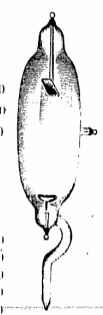


Edison Focus Tube.

Focus Tubes, small size,	$ 5.00
Focus Tubes, medium size,	6.00
Focus Tubes, large size,	8.00
Focus Tubes, extra large size,	10.00
Adjustable Stand, for tubes,	2.00
Re-exhausting Focus Tubes,	2.50

When ordering Focus Tubes always state whether required for use on Battery Coil, break-wheel apparatus, or Static Machines.

Edison Adjustable Focus Tubes.



Edison Adjustable Focus Tube.

Adjustable Tubes, medium size,	$ 8.00
" " large "	10.00
Spark Gap Adjuster, (See page 34)	1.50

Edison Fluoroscopes
(With Tungstate of Calcium Screens)

3 in. x 4 in. size,	$ 5.00
5 in. x 5 in. size,	7.50
5 in. x 7 in. size,	9.00
6 in. x 8 in. size,	11.00
7 in. x 9 in. size,	13.50
8 in. x 10 in. size,	16.00

Fluoroscopes, in larger sizes, furnished on application.

Edison Fluorescent Screens (Tungstate of Calcium.)

15 Cts. Per Square Inch.

Edison Fluoroscopes (with Barium-Platino-Cyanide Screens.)

3 in. x 4 in.,	$ 6.50
5 in. x 5 in.,	10.00
5 in. x 7 in.,	12.50
6 in. x 8 in.,	16.00
7 in. x 9 in.,	20.00
8 in. x 10 in.,	24.00

Edison Fluorescent Screens (with Barium-Platino-Cyanide.)

25 Cts. Per Square Inch.

Edison Portable Focus Tube Holder with Cords, complete (as described on page 35) **$8.00.**

Faradic Batteries.

The EDISON-LALANDE battery, on account of its great constancy of current, and also its absence from local action when not in actual service, is most suitable for use in faradic batteries. We have, therefore, placed on the market a line of these batteries to fill the requirements of the general public and also for advanced specialists in electro therapeutics.

The coils in these batteries are so wound that the strength of the current in the primary and secondary winding is perfectly progressive.

The vibrations obtained are of a very pleasing character, being entirely free from uneven pulsations, a cause of considerable trouble frequently experienced.

When battery is not in action, it is unnecessary to remove the zincs from solution (as in most other faradic batteries), but simply to turn the switch, as there is no waste on open circuit.

The current furnished by the cells is perfectly constant, so that battery can be used for hours without falling off in strength

The cost of renewal of battery is very low and perfectly easy to accomplish.

Edison Universal Faradic Battery.

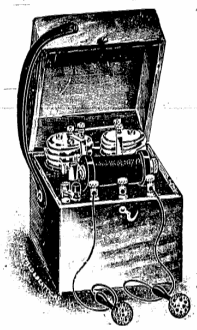
Price, complete, in polished quartered oak case together with metal electrodes, $7 50

Cost of Renewal of Battery.

1 Oxide Plate, "B,"	[illegible] cts.
1 Zinc Plate, "B,"	[illegible] cts.
1 Can Potash [illegible]	[illegible] cts.
[illegible] Bottle Paraffin [illegible]	[illegible] cts.
[illegible]	[illegible] cts.

[illegible]

For prices of cell separately and permanent [illegible]



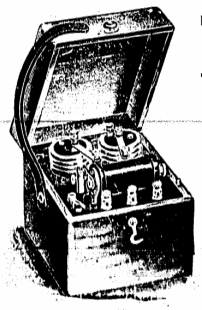
Edison Family = Faradic = Battery.

Price, Complete, in Polished Quartered Oak Case, together with Sponge Electrodes, - - - - $10.00

Price of Renewal Parts for Both Cells.

2 Copper Oxide Plates, B, at 8c.	$0.16
2 Zinc Plates, . . . B, at 8c.	.16
Can containing 4 sticks Potash, B	.16
2-oz. Bottle of Oil for 2 Cells, . .	.05
Total, ...	$0.53

The Copper Oxide Plate and Zinc Plate will stand two charges (one renewal) of Caustic Potash solution before being exhausted.



Edison Physicians' Faradic Battery.

Price, Complete, in Polished Quartered Oak Case, together with Sponge Electrodes, - - - - $15.00

The same with interchangeable fast and slow vibrators. **$16.00**

Price of Renewal Parts for Both Cells.

2 Copper Oxide Plates, B, at 8c.	$0.16
2 Zinc Plates, . . . B, at 8c.	.16
Can containing 4 sticks Potash, B	.16
2 oz. Bottle of Oil sufficient for 2 Cells,	.05
Total, ...	$0.53

The Copper Oxide Plate and Zinc Plate will stand two charges (one renewal) of caustic Potash solution before being exhausted.

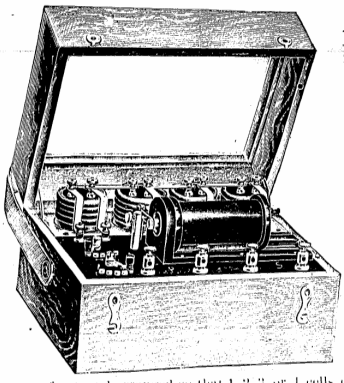
Prices of Accessories.

Sponge Electrodes and Handles	per pair,	$1.00
Metal Handles, . .	"	.50
Battery Cords, . .	"	.50
Slow Vibrators . .	each	1.00

For prices of complete cell separately and permanent parts of same see page 47

The Edison High Tension Faradic Battery.

Price, Complete, $40.00



PRICE OF RENEWAL PARTS FOR ABOVE CELLS

4 Oxide Plates, B, at 8c,	$0.32
4 Zinc Plates, B, at 8c.	.32
2 Cans Caustic Potash (1 in.) B, at 16c,	.32
1 4 oz. Bottle Oil,	.05
Total . . .	$1.01

The Faradic coil on this battery is of the DuBois-Raymond type, and the secondary coil of same, which is entirely removable, is wound with about 1,800 yards of No. 36 B. & S. wire, which is divided into six equal sections. Each of these sections is brought out to separate connections at the end of the spool, and they can be thrown into the circuit as desired by a switch provided for that purpose. The coil is operated by four Edison-Lalande cells attached to the switch in front of cut, and arranged so that 1, 2, 3, or 4 cells can be thrown into the circuit at will. There is also a graduating rheostat in the primary circuit for controlling the current from the battery. This outfit is constructed entirely on the approved recommendations of the American Electro Therapeutic Association.

Edison Cautery Batteries.

The Edison **Cautery Batteries** have been specially designed to meet the large and increasing demand of physicians and surgeons for a reliable battery, capable of furnishing a heavy current for cautery work, and which will not deteriorate while standing idle.

The battery, when set up, will last, with ordinary use in cautery work, for several months, during which time it requires no attention whatever, and when exhausted, the elements can be renewed at a small cost.

The cells are closed and the elements do not have to be removed from the solution, as there is practically no action when cells are not in use, and consequently no waste in the battery.

It is also equally well adapted for running small motors, sewing machines and battery, and for lighting electric headlights for throat work and other ordinary domestic purposes.

Being a primary battery, it is entirely independent of any external system, and does not require to be sent to a central station to recharge, as is the case with storage batteries.

The internal resistance is really only a fraction of an ohm, therefore the whole energy of the battery is thrown into the external circuit, and our cautery cells will deliver on a short circuit from [illegible] amperes according to the size.

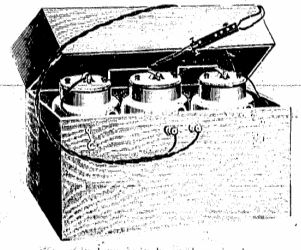
The three-cell battery shown below is intended only for use in light throat and nose work, and is sent out complete with cautery handle and knife. For heavy work and where the physician also wishes to run motors and small diagnostic lamps, we make the eight-cell battery described on page 49. These cells, if desired, can be placed in a closet or cellar and connected to the rheostat in the operating-room by heavy copper leads not smaller than No. 8 B. W. G. insulated wire.

We wish particularly to call the attention of the medical profession to some of the advantages our batteries have over any other cautery battery (either storage or primary), that should prove it to be indispensable to every well-equipped office.

They require absolutely no attention until they need recharging. The current is perfectly constant during the whole life of the battery, so that there is no danger of burning out either lamps or cautery knives. They are always ready for use.

In volume III. of "A System of Practical Therapeutics," Dr. H. N. Spencer, of St. Louis, in his article of "Chronic Catarrhal Diseases of the Naso-pharynx and Consequent Diseases," says: "By far the most perfect battery is the Edison-Lalande. I am indebted to Professor Barker, of the University of Pennsylvania, for my first knowledge of this instrument. Its superiority over all others consists in its absolute reliability. I have employed one daily for six months at a time without recharging it."

Edison 3 Cell Cautery Battery.



Size, 7⅝ in. long, 5 inches wide, 7 in. deep.

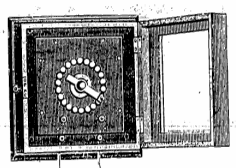
Battery consists of 3 type "W" cells contained in a handsome polished lead-lined oak box.

Complete with Cautery Cords, Cautery Handle and one Knife, $28.00.

For Prices of Renewal Parts of "W" Cell, see Page 15 of Battery Catalogue.

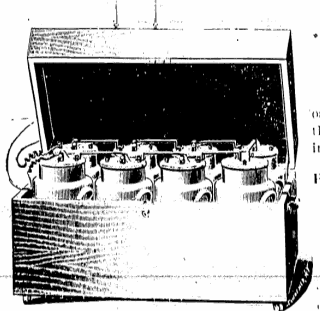
This battery is not adapted for running either motors or diagnostic lamps nor will it heat a platinum point.

Edison 8 Cell Cautery Outfit.



This outfit consists of 8 Edison-Lalande cells, type "W," in lead-lined, polished oak box, mounted on castors and provided with lock—Combination rheostat for cautery, lamp, and motor regulation in oak case with beveled glass cover — Heavy leads connecting battery to rheostat—Cautery cord — Cautery handle, as shown on page 52, and one cautery knife.

Price, Complete, - $75.00



Same outfit, but omitting the oak box holding the cells, and the case with glass cover holding the rheostat

Price, $60.00

If the cautery handle and knife are not required, the price of the outfit will be reduced $5.00.

Size, 18 in. long, 11 in. wide, 19 in. high.

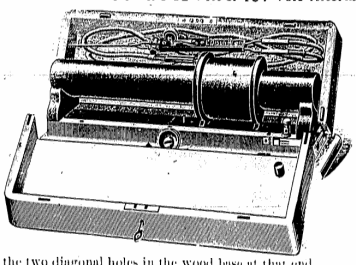
If the battery is placed in a cellar and connected with the rheostat in the operating-room by heavy wire leads, it is not necessary to have the oak box, which will make a reduction of $10.00, and if the case with glass cover containing the rheostat is also omitted the price is still further reduced $5.00. See price list above.

For Price of Renewal Parts of "W" Cell, see page 17.

These batteries are also adapted for some cautery work, for running small diagnostic lamps and for operating surgical motors. See page 51 of catalogue.

The Holman Electrical Centrifuge described on page 55, can also be run very satisfactorily on this battery, which will also operate a **4-inch Edison X-Ray Coil**, see page 40. (Combination Cautery and **X-Ray Outfit, No. 350.)**

THE EDISON
Alternating Current Cautery Transformer,
For Use on the 52 Volt or 104 Volt Alternating Current.



The object of this small instrument is to enable physicans to use the 52 volt and 104 volt alternating current for electro cautery and diagnostic lamp purposes.

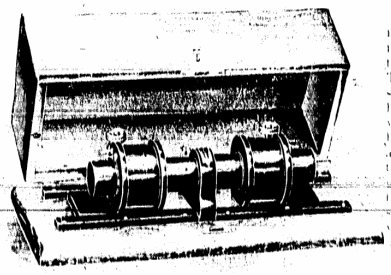
The current from the mains is lead into the primary coil by connecting the attachment cords from the mains, to the two binding posts on the right hand end of the instrument after first threading the ends of the cords through the two diagonal holes in the wood base at that end.

The secondary coil is wound on the movable spool. It is operated by a ratchet device, and the terminals are brought out to two pin attachments mounted on one head of the coil, to which the cautery cord or diagnostic lamp cord can be attached. By moving the coil to the right, the current is increased, and vice versa.

The apparatus is mounted on a highly polished oak base, provided with cover, as shown in the cut, and is fitted with a switch at the back which automatically cuts off the current from the mains, when the cover is closed.

Price, with attachment cord, plug, and cautery cord, - $25.00

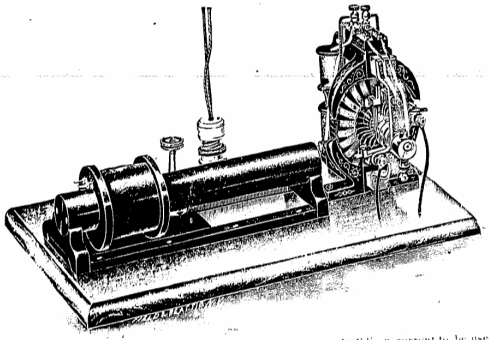
THE EDISON
Alternating Current Combination Transformer,
For Use on the 52 Volt or 104 Volt Alternating Current.



This instrument is similar in construction to Cautery Transformer described above, but is provided with two movable coils for enabling the Cautery and Laryngoscopic Lamp [illegible] used at the same time and yet to be regulated independently of each other.

Price, with attachment cord, plug, and cautery cord - $30.00

THE EDISON
Direct Current Cautery Transformer,
For Use on 110 to 120 Volt Direct Current.



This apparatus is designed to enable the direct 110 to 120 volt Edison current to be used with absolute safety for electro cautery work, and will be found of the greatest assistance to those physicians whose offices are equipped with this current. It is also suitable for hospital work as nearly all the most prominent institutions are lighted by the direct current.

It consists of an Edison Motor Generator which is so designed that the direct current is converted into an alternating current which excites the primary of the transformer shown on the left of the cut, and is identical with the instrument described more fully on the preceding page. This instrument will also operate any make of diagnostic lamps most efficiently. The apparatus is mounted on a highly polished oak base and is provided with an attachment plug and ten feet of flexible cord for connecting the instrument to the mains.

Price, with attachment cord, plug, and cautery cord, - $55.00

THE EDISON
Direct Current Combination Transformer,
For Use on the 110 to 120 Volt Direct Current.

Same instrument as described [illegible] Transformer [illegible] shown in lower cut on preceding [illegible] be used at the same time.

Price, with attachment cord, plug, and cautery cord, - $60.00

THE EDISON
Direct Current Combination Cautery, Lamp and Surgical Motor Transformer Outfit.
For Use on the 110 to 120 Volt Direct Current.

[illegible]

Price, with attachment cord, plug, and cautery cord, - $75.00

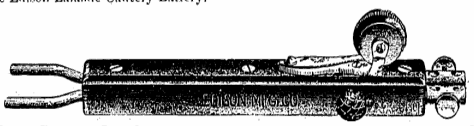
Edison Cautery Handle and Knives.

We wish to call particular attention to our improved Cautery Handle and Knives.

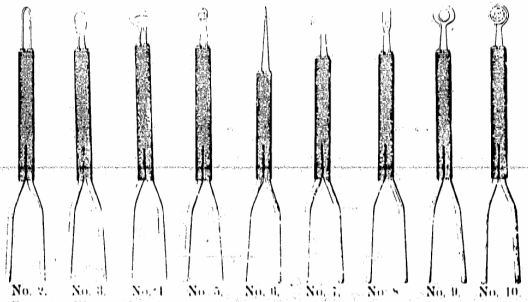
The handle is adapted for both knife and snare work, and particular attention has been paid to the interior construction, so that all trouble caused by imperfect contact is eliminated—a fault so frequently found in the handles in present use.

The knives are constructed on strictly scientific principles, so that the whole energy of the battery is concentrated in the platinum tip, instead of being wasted before reaching that point

We were induced to take up the manufacture of these knives from the fact that up to the present time there have been no cautery knives made to a definite standard. We may add that all these knives are thoroughly tested and standardized before leaving the factory and are guaranteed to give perfect satisfaction with the Edison-Lalande Cautery Battery.

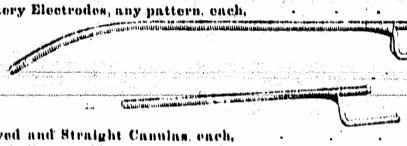


Edison Cautery Handle, complete,	**$5.00**
" " " **without snare attachment,**	**4.00**
Platinum Snares,	**1.25**



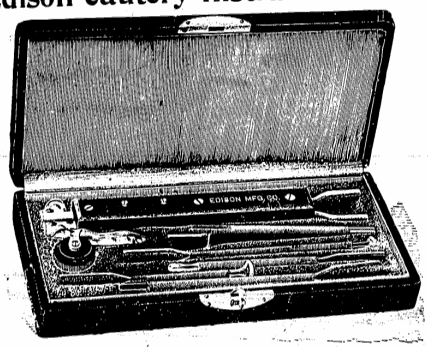
No. 2. No. 3. No. 4 No. 5. No. 6. No. 7. No. 8 No. 9. No. 10.

Cautery Electrodes, any pattern, each,	**$1.00**



Curved and Straight Canulas, each,	**$1.00**
Aseptic Cautery Electrodes, in all of the above patterns, each,	**1.25**

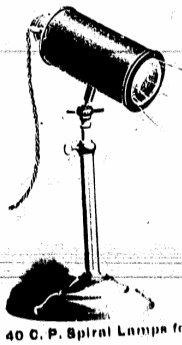
Edison Cautery Instrument Case.



Morroco Leather Case containing one Edison Cautery Handle, with Snare Attachment, Canula and Platinum Snare, also one each Nos. 3, 4, 5 and 6 Cautery Knives, . $13.50

CAUTERY ACCESSORIES.

Combination Cautery Rheostat in oak case, with beveled glass front (see page 49), . . .	**$17.00**
Combination Cautery Rheostat on polished oak base, with hard rubber top, without case, .	**12.00**
Polished Oak Case with beveled plate-glass cover, lock and key, to contain Cautery Rheostat, ...	**5.00**
	5.00
	2.50
Sliding Rheostat for X-Ray and Cautery work, ...	**2.00**
Cautery Cords, ...	**.10**
Heavy Wire Cautery Leads, ten feet long, per pair, ...	
Leads over ten feet will cost per foot.	



EDISON-DELAVAN CONDENSER,

For Throat Illumination.

For use on

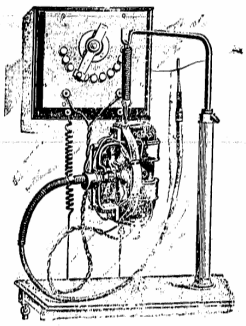
110 to 120 Volt Direct Current and 52 and 104 Volt Alternating Current.

This Condenser has been designed to take the place of the old McKenzie Condenser, where street current can be obtained. The incandescent lamp is so constructed that there is absolutely no shadow thrown on the object examined. It is fitted with a Ball and Socket Attachment which allows the lamp to be adjusted to any angle, making it much more convenient to the operator.

Price, complete, with flexible Cords and Plug Attachment, $15.00

40 C. P. Spiral Lamps for Edison-Delavan Condenser, $1.00 each.

The Edison Surgical Motor Outfit.



Comprising Edison Non reversing Suspension Motor with Coupling and Suspension Spring, Flexible Shaft with Extra Flexible Extension and Hand-piece, Regulating Motor Rheostat, Adjustable Standard with Bent Arm, Floor Push and Cords and 8 Edison-Lalande cells, type "W," and battery leads.

Price, complete. $85.00.

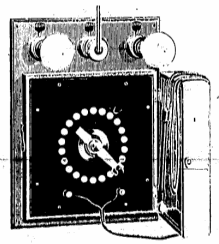
Same outfit, but without 8 Edison-Lalande cells, type "W," and battery leads connecting battery to rheostat.

Price, - $48.00

Prices of Separate Parts.

Edison Non reversing Suspension Motor with Coupling and Suspension Spring,	$15.00
Flexible Shaft with Extra Flexible Extension and Hand-piece,	17.00
Adjustable Standard with Bent Arm,	5.00
Regulating Motor Rheostat,	8.00
Floor Push and Cords,	3.50
Battery Leads,	2.00
Battery of 8 Edison-Lalande cells, porcelain jars, type "W," with charge for same,	38.80

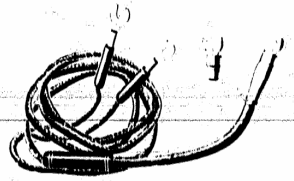
This battery is also suitable for Cautery work when used with a regulating Rheostat made specially for this purpose. See Page 40.



The Edison Miniature Lamp Regulator.

For using Diagnostic Lamps on the 110 to 120 Volt Direct Current and the 52 and 104 Volt Alternating Current.

Price, with Attachment Plug and Cords (but without Throat Lamp, Lamp Holder and Cords), - **$25 00**



Edison Throat Lamp Lamp Holder and Cords, **$4 00**

Lamps, separately, for above, **1.80**

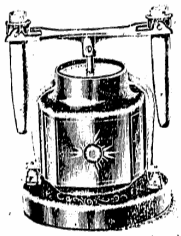
THE EDISON-HEIMAN ELECTRICAL CENTRIFUGE

— FOR —

Investigation of Urine, Blood and Bacteria.

To Run on the 110 to 120 Volt Direct Current, and 52 and 104 Volt Alternating Current Also by Edison-Lalande Battery.

DESCRIPTION.



In the construction of the EDISON-HEIMAN ELECTRICAL CENTRIFUGE, special attention has been paid to the production of an instrument that can be rotated at a uniform velocity, as only in this way can true scientific results in urine and blood examinations be obtained. It is well known that it is impossible to run the old fashioned hand Centrifuge at a uniform rate of speed, and consequently the results obtained from such crude devices show a surprising lack of uniformity. When, however, electricity is substituted for hand power, as is the case with the above instrument, a great advance has been accomplished in scientific analysis.

The above Illustration shows the improved Edison-Heiman Electrical Centrifuge. It consists of an Iron Clad Motor, the armature of which runs in the horizontal plane. The lower end of the armature shaft is made of hardened steel, and runs in a jewelled bearing, which reduces the frictional loss to a minimum. There is a special oiling device for this bearing on the front of the motor, so that it can always be kept well lubricated, which is important. The upper end of the armature shaft, to which the urine attachment is connected by a set screw is extended beyond the body of the motor. This consists of a cross arm, carrying at each extremity tapered metal shields, into which glass tubes fit closely.

These tapered metal shields are hooked on to the cross arm by a most simple device, thus enabling them to be instantly removed for all purposes, while at the same time it is absolutely impossible for them to fly off when the Centrifuge is being rotated.

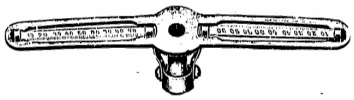
The cross arm of the urine attachment is solidly constructed and consists of a strong aluminum casting, which is perfectly rigid. The cross arm with the pendent tubes, when extended in the horizontal position, has a diameter of 14 inches. The glass tubes fitting into the tapered metal shields are of the same general shape as the latter, and are accurately calibrated in tenths of a cubic centimeter up to ten cubic centimeters, with spice above for reserve. Each end of the metal shield is provided with a cork cushion to prevent the glass tube from breaking when the cubic centimeters rest or are set on the shield.

When the machine is required for milk testing purposes it is necessary to employ a special shaped graduated glass tube with flat bottom and also aluminum shields of similar shape.—These shields can be instantly hooked on to the cross-arm in place of the tapered urine tubes.

The Edison-Heimen Centrifuge is so constructed that the cross-arm carrying the urine or milk tubes can be removed at will, and the Hematocrite substituted without a moment's delay, as the armature shaft of the motor is of such a size, that both the urine and milk attachments and the Hematocrite are interchangeable.

This latter instrument consists of a metallic frame, carrying two graduated capillary glass tubes, in which is placed the blood freshly drawn.

These accurately graduated glass tubes, seated in rubber-cushioned cups, are held in position securely by a spring, so that there is no possible danger of losing the tubes during rotation.



The Edison-Heiman Centrifuge is made to run on the 110 to 120 volt direct current, on the 52 volt and 104 volt alternating current and also by battery power

It is important, when ordering electric light outfits, to state whether they are required to run on the 110 to 120 volt direct current, or on the 52 volt or 104 volt alternating current.

All electric light outfits are provided with a suitable controlling rheostat for graduating the speed of the machine, and a velocity of 2,000 revolutions per minute with the urine attachment, or 8,000 r. p. m., with the Hematocrite can easily be obtained.

The battery outfit with type "W" cells is a most complete combination equipment, and it is provided with a rheostat which besides being used for the purpose of controlling the speed of the Centrifuge, can also be used for electro cautery work, operating miniature lamps for diagnostic purposes, running surgical motor of suitable voltage, and operating spark coil for X Ray apparatus. The velocity of the urine attachment of the battery outfit is upwards of 1,900 r. p. m. and when the Hematocrite is substituted the speed is increased to 8,000 r. p. m. which is above the requisite velocity for blood and bacterial examinations.

It is of the utmost importance for the investigator to know the exact number of revolutions per minute at which the Centrifuge is rotating, as the speed per minute is a most important factor in the results obtained with this instrument.

It is therefore so constructed that an Alarm Speed Indicator can be instantly attached to the machine while it is running.

We can furnish these Speed Indicators, with Special Attachment for the Heiman Centrifuge, at a very slight additional cost. (See page 58.)

. . . PRICE LIST . . .

EDISON-HEIMAN ELECTRICAL CENTRIFUGE OUTFIT

To Run on 110 to 120 Volt Direct Current, and the 52 Volt or 104 Volt Alternating Current.

...CONSISTING OF...

1 Edison-Heiman Electrical Centrifuge, with urine attachment, 1 graduated tube and 2 plain tubes.
1 Speed Regulating Rheostat,
1 Hæmatocrite, with 2 graduated tubes, and 2 plain tubes.
1 Snap Switch.
1 Attachment Plug and Cord.

Price, complete, $35.00.

Milk Testing Attachment including 2 Graduated Milk Bottles, 2 Aluminum Shields for same, and 2 Graduated Pipettes, per set, ... $5 00 extra

Centrifuge Safety Guard, ... 3 50 extra.

EDISON-HEIMAN ELECTRICAL CENTRIFUGE BATTERY OUTFIT

CONSISTING OF

1 Edison Heiman Electrical Centrifuge, with urine attachment, 1 graduated tube and 2 plain tubes.
1 Hæmatocrite with 2 graduated tubes and 2 plain tubes.
8 Edison Lalande Cells, type S, in metal lined polished oak box, with castors,
1 Speed Regulating Rheostat.
1 Attachment Cord for connecting battery to Rheostat and Rheostat to Centrifuge

Price complete, $55 00

EDISON-HEIMAN

Combination Electrical Centrifuge, Cautery, and Miniature Lamp Battery Outfit.

...CONSISTING OF

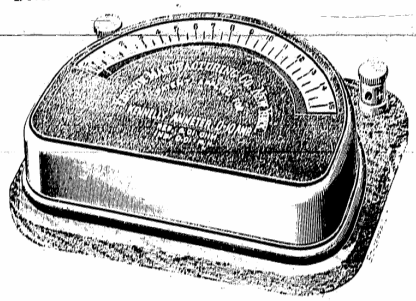
1 Edison-Heiman Electrical Centrifuge, with urine attachment, 1 graduated tube and 2 plain tubes.
1 Hematocrite, with 2 graduated tubes and two plain tubes.
8 Edison-Lalande Cells, type "W," in metal lined polished oak box, with castors and lock.
1 Combination Rheostat, for regulating speed of Centrifuge, and for controlling heat of cautery knives and miniature lamps, fitted in oak case, with bevelled glass cover.
1 Pair of heavy leads connecting battery to Rheostat.
1 Flexible Cord connecting battery to Centrifuge.
1 Cautery Cord, 1 Cautery Handle, 1 Cautery Knife
1 Mouth Lamp, with holder and cords.

Price, complete, $97 50

PRICE OF SEPARATE PARTS :

Edison-Heiman Electrical Centrifuge, with urine attachment, 1 graduated tube and 2 plain tubes,		$20 00
Extra Graduated Tubes for same,	each,	75
Plain Tubes for same,	"	.25
Graduated Milk Bottles,		.75
Aluminum shields for graduated milk bottles,		1.00
Graduated Pipettes for use with milk bottles,		.75
Alarm Speed Indicator, with Special Attachment,		1 50
Hematocrite, with 2 graduated tubes and 2 plain tubes		5 00
Centrifuge Safety Guard		3.50
8 Edison Lalande Cells, Type "S," in metal lined polished oak box,		30 00
8 Edison Lalande Cells, Type "W," in metal lined polished oak box,		18 80
8 Edison Lalande Cells, Type "W," without metal lined box,		38 80
1 Combination Rheostat, for regulating speed of Centrifuge and for controlling heat of Cautery Knives and Miniature Lamps, fitted in oak case, with bevelled glass cover,		17 00
1 Combination Rheostat, as above but without glass cover,		12 00
1 Pair Heavy Leads, connecting Battery to Rheostat,		2 00
1 Flexible Cord, connecting Battery to Centrifuge,		1 00
1 Cautery Cord		2 50
1 Cautery Handle		5 00
1 Cautery Knife		1 00
1 Mouth Lamp with Holder and Cords		1 00

THE EDISON
STANDARD AMMETER AND MILLIAMMETER.



Ammeters.

Scale 0 to 5 amperes, divisions $\frac{1}{10}$ ampere,		$40.00
" 0 to 15 " " $\frac{1}{10}$ "		40.00
" 0 to 25 " " $\frac{1}{2}$ "		45.00
" 0 to 50 " " 1 "		50.00

Milliammeters.

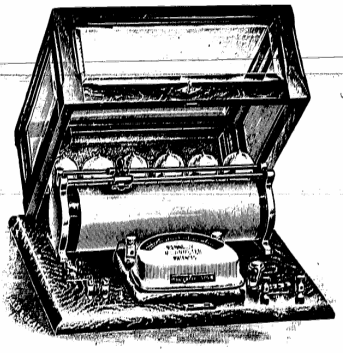
Scale 0 to 100 milliamperes, divisions 1 milliampere,		$37.50
" 0 to 200 " " 2 "		37.50
" 0 to 500 " " 5 "		37.50

A few points demonstrating the special features distinguishing these instruments from all others now in use:

1st. They have no iron, steel, or magnetic metal in their moving parts, and consequently will not alter or demagnetize under any reasonable treatment
2nd. They are not affected by the earth's magnetic field, nor even by the stray field of dynamos beyond a few feet radius.
3rd. The scales are nearly uniform, and very distinct, being read off with mirror to avoid parallax.
4th The movements of the indicator are practically dead beat.
5th. The instruments are calibrated and standardized at the Edison Laboratory.
6th. They have very low resistance and inductance, so that they possess great electromagnetic power, combined with very little influence upon the circuit whose current strength they measure. The resistance of the 500 milliam pere instrument is 0.3 ohm and its inductance 5 micro henrys.
7th They are very compact and portable, the outside dimensions of the instrument being 6¼ in. x 8¼ in. by 2½ in. high and their weight in wooden case, 4¼ pounds.
8th There are no adjustments, leveling screws or clamps for shipment, so that the instruments are always ready for operation, and can be used in any position.
9th. The binding posts are large and strong. They will take a large wire by penetration or a small wire by clamping.

The Edison Fractional Volt Selector For Cataphoresis.

For 110 to 120 Volt Direct Current.



This apparatus has been designed to meet the demand of the Dental Profession for a reliable instrument for enabling the Edison direct current (110 to 120 volts) to be used for Cataphoresis and the production of Local Anesthesia.

It consists of a hard-rubber cylinder, upon which is wound, in suitable grooves cut on the face of same, several hundred feet of german silver wire, having a very high resistance. This current controller is regulated by the sliding contact shown in the cut, which travels along the two rods above, parallel with the cylinder, and which bears lightly and uniformly on the convolutions of the wire.

The apparatus is so constructed that it is impossible for any dangerous current to reach the patient.

One of the great advantages of this instrument is, that the operator can vary the voltage to any pressure that he may desire to use. The initial voltage of the Edison direct-current is usually about 120 volts, but by means of the Volt-Selector-Switch (shown on the right hand of the board) it is possible to obtain a current which will vary from a voltage of zero to only 20 volts by moving the switch lever one button to the right.

If the switch lever is moved two buttons to the right, the voltage of the instrument will now vary from zero to 40 volts. Similarly if the switch lever is moved three buttons to the right, the voltage will vary from zero to 60 volts; if moved four buttons to the right, from zero to 80 volts, and if moved to the extreme limit of five buttons, the voltage will, in this case, vary from zero to 100 volts.

The german silver wire current-controller (referred to above), is so connected, that it acts as the most perfect fractional volt selector, as well as a current regulator. If a volt meter is connected across the binding posts to which the electrodes are usually attached, and the sliding contact is gradually moved from the extreme left to the extreme right, it will be found that the voltage will rise uniformly from zero to its maximum limit.

By means of the large number of convolutions of wire on the current controller, it is possible to vary the voltage by **one-hundredth of a volt** at a time. Such perfect regulation is impossible with any other instrument of this character on the market.

Price, complete with Edison Milli-Ammeter, $80.00.

Price, without Edison Milli-Ammeter, $50.00.

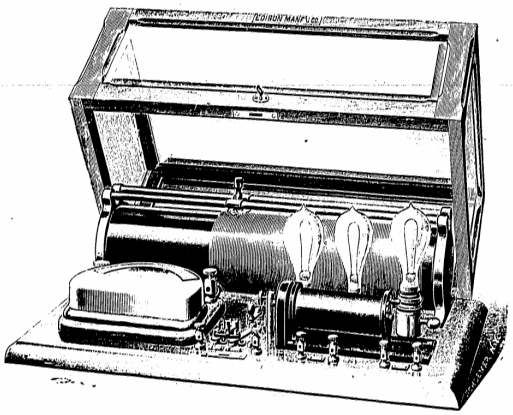
The apparatus can also be furnished with a battery in cases where the Edison direct current cannot be obtained for which an extra charge is made.

THE EDISON COMBINATION

GALVANIC AND FARADIC ADAPTOR

For Use on 110 to 120 Volt Direct Current.

(EDISON CIRCUIT)



The Following Currents can be Obtained from this Instrument:

1st. The Direct Galvanic Current of 110 to 120 volts.

2nd. The Direct Galvanic Current of 60 volts.

3rd. The Primary Faradic Current, capable of 6 variations of strength, depending on the number of sections of the secondary coil that are short circuited.

4th The six Secondary Faradic Currents, all of which manifest distinct characteristics.

5th The Primary Faradic Current superposed on the 110 to 120 volt Galvanic Current.

6th The Primary Faradic Current superposed on the 60 volt Galvanic Current.

The instrument is handsomely mounted on a polished quartered oak base, and enclosed in a bevelled-plate glass case, provided with lock.

Price, complete, $125.00.

DESCRIPTION.

One of the most urgent inquiries of the physician of to day is for an instrument by which he can use the Edison 110 or 120 volt direct current for all varied forms of electro-therapeutic treatment with absolute safety to the patient, and at the same time be able to graduate and control it within the finest limits, and also accurately measure the strength of the current he is employing

Such an apparatus is illustrated on the preceding page, and has been designed with a special view to fulfilling all these requirements.

It consists of a hard-rubber cylinder, upon which is wound in suitable grooves, cut on the face of same, several hundred feet of German silver wire having a very high resistance.

This rheostat is regulated by the sliding contact which travels along the two rods above and parallel with the cylinder.

A 16 C P. lamp is placed in circuit with each of the leading in wires, to effectually protect the patient and apparatus, should a short circuit occur on any part of the electric light circuit.

A third lamp, shown on the extreme right, provided with a key, is arranged in shunt with the rheostat. When the key is turned on, the voltage of the galvanic current is reduced to 60 volts. With this shunt in operation, and all the resistance of the rheostat thrown into the circuit, by moving the sliding contact to the extreme left, a current of one milliampere is obtained when the binding posts are connected together by a short piece of wire, i. e., short-circuited. On moving the sliding contact to the right, the resistance is very gradually diminished, and the current correspondingly increased. This finely graduated current is required in some cases where a very slight irregularity in the current would produce a shock to the patient.

When a stronger current is required, the lamp is cut out by turning off the key, and the current is used unshunted.

The well-known Edison milliammeter is mounted on the base on the left, the pole-changing switch is placed in the middle of the board, while on the right is shown the faradic coil, which is also operated by the street current.

This is of the Du Bois Raymond type, the secondary being wound upon a separate spool, removable at will. This secondary winding consists of 24 layers of No. 34 wire, having a total length of about 1800 yards. The winding is tapped in 6 places, so as to divide the coil into 6 sections, each section consisting of 4 layers of wire, the whole being connected in series. By this arrangement 4, 8, 12, 16, 20 or 24 layers of secondary winding can be used as required, by moving the switch shown on the end of the coil.

Each section produces an entirely different sensory effect, the current in the first section being very stimulating, whereas the current in the sixth section is of a very pleasing character and produces a sedative effect, the character of the current in the other sections being intermediate between the two extremes. When first put into operation the secondary coil should always be moved to the extreme right so as to leave the primary uncovered, the strength of the current being increased by slowly moving it toward the left, so as to finally cover the primary coil.

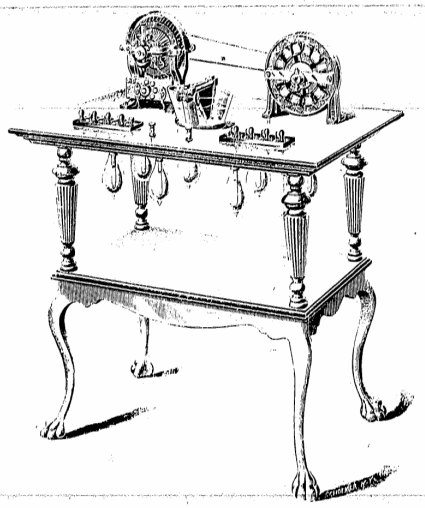
The current in the primary, on the contrary, is at a minimum when it is entirely covered up by the secondary coil, which in this case must be short circuited by a switch marked S C S provided for that purpose on the movable coil, and it is increased by sliding back the secondary coil to the right

When the "**Faradic**" switch at the back of the pole changing switch is turned on and the vibrator set in motion, the current from the **galvanic binding posts** is now of a pulsating character, as the current in the primary of the Faradic coil is superposed on the straight galvanic current thereby producing the prevailing current as described by Dr. Du Bois Reymond. The strength of the two combined currents is controlled by the rheostat in the ordinary way.

THE EDISON

Therapeutic Sinusoidal Machine

For Use on the 110 to 120-Volt Direct Current.



Including Edison Alternator 110 to 120-Volt Motor Water Rheostat 2 Lamp Resistances for regulating speed of motor and intensity of exciting current in alternator, mounted on polished oak table with attachment plug and cords, and sponge electrodes, handles and cords. Price, complete, $100.00.

DESCRIPTION.

This little alternator shown in cut on top of table, on right is intended for the production of sinusoidal alternating currents for electro therapeutic treatment. It is driven by a small motor running on the Edison direct 110 to 120 volt current shown on left. The field frame is of laminated iron supported by castings, and shown on left. The field frame is of laminated iron supported by castings and has twelve poles. On each pole is a spool with two windings on it. The inner has eight layers of fine wire and the outer two layers of coarse

All the fine wire windings are connected in one series, which constitutes the secondary or delivery coil. All the coarse wire windings are connected in another series, forming the primary or field winding of the machine. By this arrangement it is only necessary to drive the armature, which is a combination of laminated iron disks, to transform the continuous primary current into alternating current waves in the secondary circuit, and by duly proportioning the grooves and projections on the armature surface these waves are made sinusoidal.

Twenty-four alternations or twelve complete periods are generated for every revolution of the armature, and since a speed of 4,800 revolutions per minute can be attained, the frequency can be carried to 1,920 alternations per second or over 115,000 alternations per minute. For steady running a more moderate speed and frequency will usually be desirable.

The primary winding of the alternator is excited by the 110 to 120-volt direct current, which is controlled by a lamp rheostat, the switchboard operating same being shown in the front of cut, **on the right,** and the lamps being placed under the table. In this way the strength of the secondary currents can be controlled independently of the frequency.

The speed of the motor, and consequently the number of alternations of the secondary currents, can be varied by the lamp rheostat shown in the front of cut, **on the left,** as this rheostat is included in the motor circuit.

The Water Rheostat shown in the centre of the table is connected in shunt with the secondary circuit, and is used to vary the strength of the current applied to the patient.

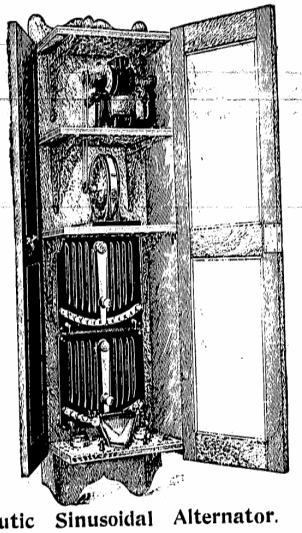
The sensations that are produced by the application of this instrument differ radically from those which result from the employment of an ordinary faradic coil. They are much softer, more agreeable, equally developed at either pole, and generally exhibit the characteristic sensations attributed to sinusoidal currents.

The electromotive force attainable in the secondary coils amounts to 50 volts; but on closing the secondary circuit, under the condition of ordinary application, the voltage at secondary terminals usually falls to less than twenty volts, depending upon the amount of external resistance.

The alternator and motor are finished in nickel and are provided with self-oiling bearings. The lamps belonging to the rheostat are all placed underneath the table, so as to avoid any inconvenience to the operator arising from the brilliancy of the lights.

The apparatus is mounted on a polished quartered oak table of handsome design, and the workmanship on the entire outfit leaves nothing to be desired. If the outfit is required for use in a city where only the alternating current is obtainable, it can be furnished with an alternating current motor in place of the direct current motor without extra charge, but it will be necessary to excite the primary winding of the alternator independently with batteries, as the alternating current cannot be used for this purpose. In ordering outfits for running on the alternating electric light circuit, please always state this fact, as otherwise outfits with direct current motors will be sent. (See also 500 volt outfit on page 65.)

The Edison Therapeutic Sinusoidal Wall Instrument for 500 Volt Circuit.

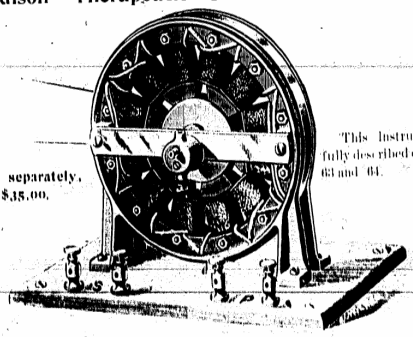


Consisting of Edison Alternator, 500-volt motor, two 500-volt Enamel Rheostats for regulating speed of motor and intensity of exciting current in alternator—Water Rheostat—mounted on wall bracket with beveled glass door with lock, and 500-volt switches on each of the leading-in wires.

Price, complete, $150.00.

This outfit will give the same sinusoidal current as that shown on page 63, the only difference being that it is designed for the 500-volt circuit.

Edison Therapeutic Sinusoidal Alternator.



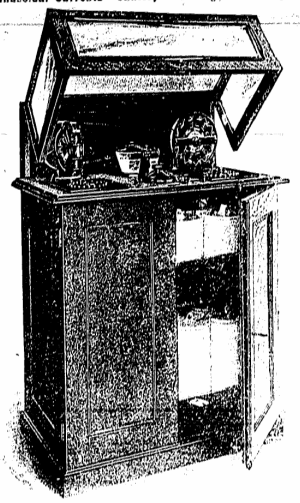
Price, separately, $35.00.

This instrument is fully described on pages 63 and 64.

66

The Edison Therapeutic Sinusoidal Battery Machine

For Sinusoidal Currents—Cautery and Diagnostic Lamp Work.



Price, complete with sponge electrodes, cords and cautery cord, handle and one Electrode, - - - $175.00

This instrument shown in cut above, has been designed to meet the need of physicians who are unable to obtain the 110 to 120 volt direct current, or the 500-volt direct current, and will be found a most efficient machine. It consists of an Edison Sinusoidal Alternator, shown on the right of cut, driven by an Edison battery motor, shown on the left of cut. It is furnished with a rheostat (shown in front of motor) for controlling the speed of same, and another rheostat (shown in front of alternator) for varying the intensity of this latter instrument.

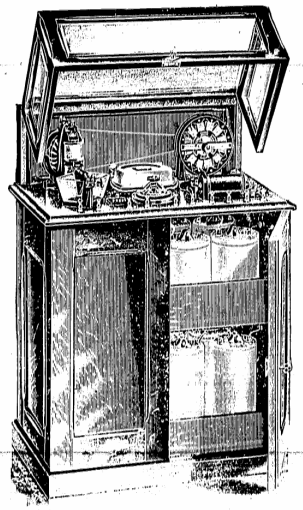
The rheostat for controlling the alternating current supplied to the patient, is shown in the middle of the cut. The motor is driven by a battery of 8 Edison Lalande cells, type "S," shown on the lower shelf of cabinet, and the alternator is excited by another battery of 8 Edison Lalande cells, type "B," placed on the top shelf of cabinet.

The instrument is fitted with a combination switch by which the two separate batteries can be connected in multiple, so as to furnish a powerful current for cautery work, the switch at the same time, opening the motor and alternator circuits, and the motor rheostat can then be used for regulating the heat of the cautery knives, or controlling the current for diagnostic lamp work for which it is most efficient. This combination battery can also be used most effectively in operating the Edison Hedman Electrical Controller and also Edison X Ray Battery outfits (see pages 55 to 58 and 59, 60 and 61.

67

EDISON COMBINATION BATTERY GENERATOR CABINET

For Galvanic-Sinusoidal-Cautery-Faradic-Motor and Diagnostic Lamp Work.



Price, complete, $250 00.

This cabinet represents the latest advance in apparatus for electro-therapeutic work and will furnish all the various currents that are required in this class of practice. It is strongly recommended for the use of electro medical specialists, and will be found a most efficient machine in every respect.

DESCRIPTION

The motor shown on the left of cut has a secondary winding that generates a galvanic current of 30 volts, which is circuited controlled by the rheostat shown in front of the motor.

The combination switch in the middle of the table controls the entire board except the faradic coil, and by turning it partly round, the current is changed from Galvanic to Sinusoidal, or Cautery as may be desired.

The entire apparatus is operated by 16 Edison-Lalande cells, arranged in 2 sets of 8—and there is absolutely no difficulty in setting up and installing this apparatus as the fullest directions accompany each outfit.

The Faradic coil on this battery is of the DuBois-Raymond type, and the secondary coil of same, which is entirely removable, is wound with about 1,800 yards of No. 36 B. & S. wire, which is divided into 6 equal sections. Each of these sections is brought out to separate connections at the end of the spool, and they can be thrown into the circuit as desired by a switch provided for that purpose. The coil is operated by the same battery and is provided with a rheostat for regulating the strength of the exciting current. This coil is constructed entirely on the approved recommendations of the American Electro-Therapeutic Association.

For further particulars write for Special Circular.