Instruction Book N 5000
Second Edition

The Nernst Lamp

Instruction Book

No. 2

More Light for Less Money

Nernst Lamp Co.
Pittsburg, Pa.
January, 1903

FIG. 1. HOW TO GRIP THE HOLDER WITHOUT DISTURBING THE GLOWERS

Do not allow the hand to touch the heater porcelain or glowers.

INSTRUCTIONS

FOR

CARE AND OPERATION

OF THE

NERNST LAMP

THIS folder gives full details concerning the care and operation of the Nernst Lamp.

A Technical description of the Nernst Lamp will be supplied to those interested upon application to the nearest sales office of

NERNST LAMP CO.

Pittsburg, Fayette Street and Garrison Place.
New York, ... 120 Broadway.
Boston, ... 131 State Street.
Philadelphia, 202 Real Estate Trust Building.

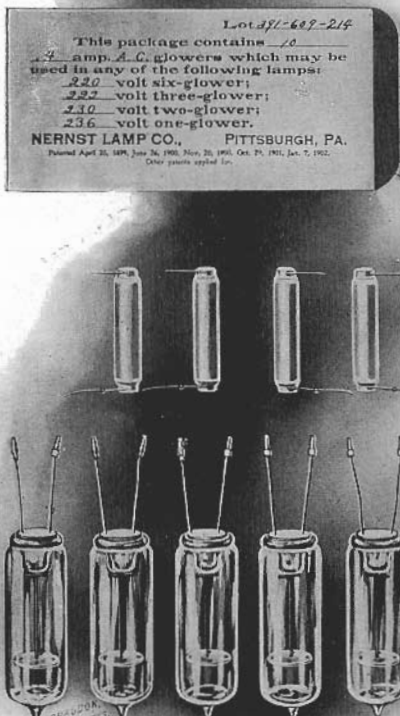

FIG. 2. GLOWERS, HEATERS AND BALLASTS FOR NERNST LAMPS

Parts of the Nernst Lamp

The elements of the Nernst Lamp are the glower, heater (made up of two or four *heater tubes*), ballast and cut-out. These are assembled in the lamp body and the holder.

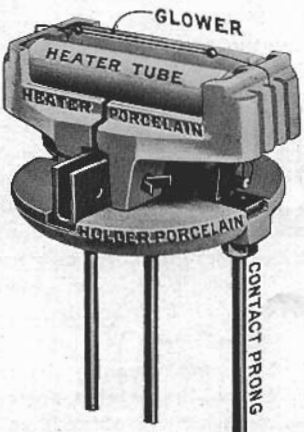

FIG. 3. NAMES OF PARTS OF THE NERNST LAMP HOLDER

Glower

The glower, or light-giving element, is a white porcelain-like rod about $\frac{1}{32}$ inch in diameter by 1 inch long. It is fastened to the holder mechanically and electrically by means of terminal wires and small aluminum plugs.

Heater The heater consists of two or more white porcelain heater tubes, each about ¼ inch in diameter, wound with a coil of fine platinum wire, and then coated over with a white refractory material.

The heater tubes are mounted on the heater porcelain, which constitutes part of the holder.

Ballast The ballast is a steadying resistance in the form of a small wire enclosed in a glass tube. A tube for each glower is mounted in the lamp body, and so connected that the current for each glower passes through a ballast.

Cut-out The cut-out is the automatic device in the lamp body for interrupting the heater current after the glowers light.

The cut-out and connections are arranged as shown in the diagram of the one-glower Nernst Lamp on opposite page. The same principle is adhered to in all the other sizes and styles.

Holder The renewable parts, that is the glowers and heater tubes, are mounted on an easily detachable part of the lamp called the holder.

Lamp Body The lamp body is the main body of the lamp in which are assembled the ballast and cut-out, and to which the globe or shade is attached.

The easily removable outside shell of spun brass or cast-iron is termed the "housing."

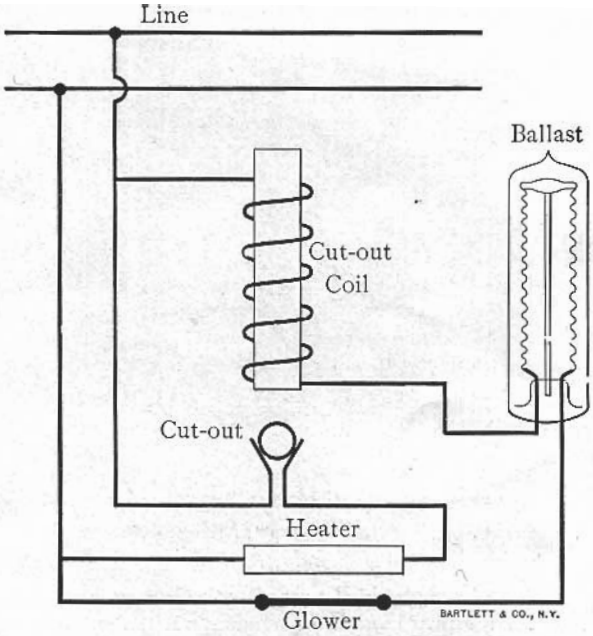

FIG. 4. DIAGRAM OF CONNECTIONS OF ONE-GLOWER NERNST LAMP

Lamp Maintenance

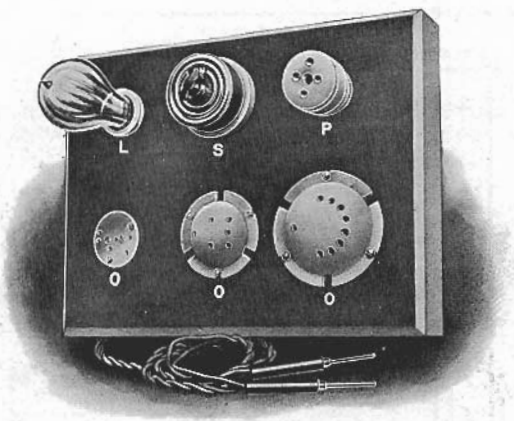

FIG. 5. TESTING BOARD
Catalogue No. 709

We have provided a set of tools, known as a Testing Board and the Attendant's Kit, for the convenience of the lamp attendant in inspecting and maintaining Nernst Lamps.

Code Word	Cat. No.	Description	Price
Verflauwen	710	Testing Board and Attendant's Kit	$12 15

Testing Board

Code Word	Cat. No.	Description	Price
Verfluss	709	Testing Board.....	$8 30

Fig. 5 on opposite page shows the testing board. It is provided with a testing lamp (L) for detecting open circuits, testing sockets (O) for holders, a snap switch (S) and an attachment plug (P) for connecting to the lighting circuit.

When the snap switch (S) is turned "off" the testing sockets and the testing lamp are entirely disconnected from the circuit.

The testing sockets (O) are adapted to receive the contact prongs of the one, two or three and six glower holders.

On pushing a holder into the socket the two heater prongs make connection with the circuit; by turning the switch "on" the condition of the heaters may be noted.

The testing lamp (L) is a 250 volt, 10 candle power incandescent lamp which is connected across the circuit when electrical connection is made between the terminals of the two flexible leads coming from the bottom of the board. When the leads are so connected the lamp, of course, lights up.

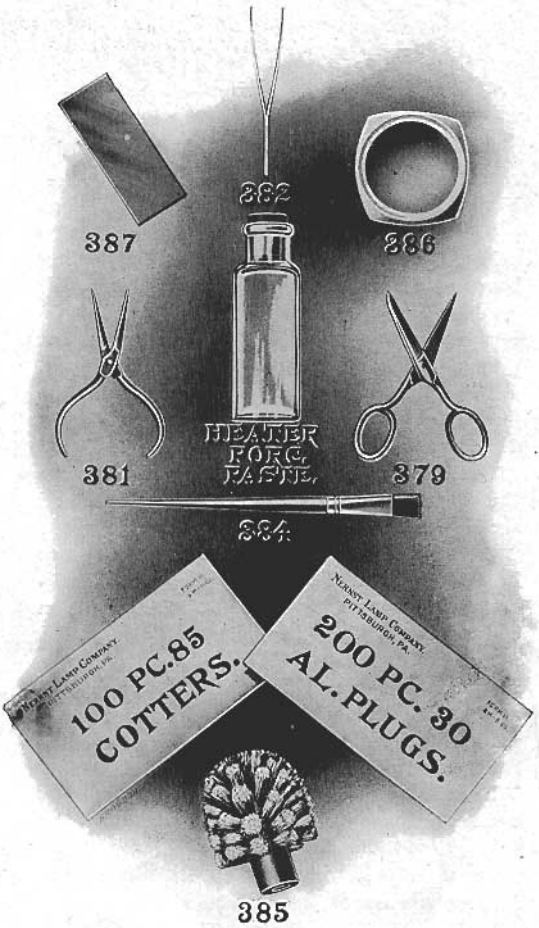

FIG. 6. ATTENDANT'S KIT IN DETAIL

Attendant's Kit

Code Word	Cat. No.	Description	Price
Verfliegen	724	Attendant's Kit	$3 85

The Attendant's Kit, illustrated in Fig. 6 on opposite page, comprises the following articles:

Code Word	Cat. No.	No. in Kit	Description	Price
Vaginatur	379	1	Scissors	$0 35
Vaginelle	381	1	Longnosed pliers	50
Vaginicol	382	1	Tweezers	35
Vaginopor	384	1	½″ paste brush	15
Vagipedes	385	1	Cleaning brush	1 00
Vagipenne	386	1	Mixing dish	35
Vagissant	387	1	Dark glass screen	10
Vagonetax	85	100	Cotter pins	20
Vagous	30	200	Aluminum plugs	50
Verflossen	667	1	Pkg. of heater porcelain paste	35

The above list comprises everything with the exception of heaters and glowers necessary to repair and maintain Nernst Lamps.

If the Attendant's Kit and Testing Board are both wanted, order catalogue No. 710.

If the Attendant's Kit only is wanted, order catalogue No. 724.

If an individual part of the kit is wanted, order by the catalogue number of the part.

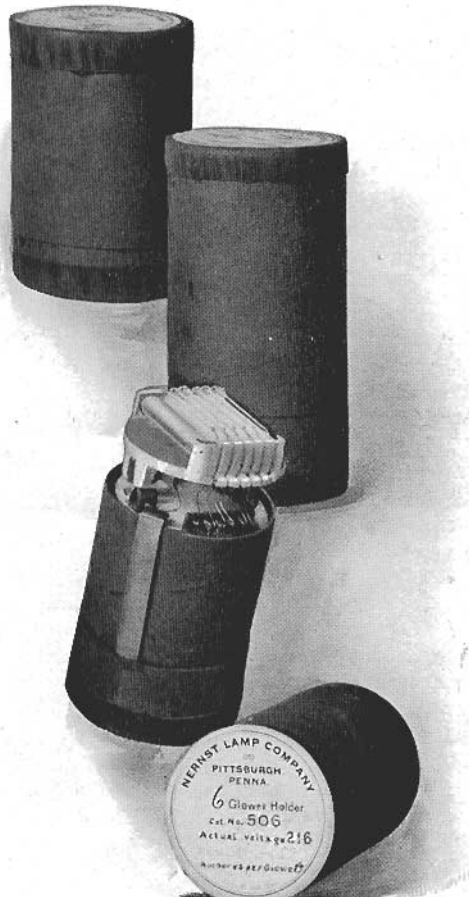

FIG. 7. BOXES FOR SHIPPING HOLDERS

General Directions for the Attendant

Inspection of Nernst Lamps on the Circuit

Inspect lighted lamps with colored glass furnished with the kit.

To determine whether a Nernst Lamp needs attention:

1st. Determine whether all the heater tubes become red when the current is turned on. If not, the old holder should be replaced with a new one.

2nd. Determine how many glowers are lighted.

The holder should be replaced:

In the six-glower lamp if two glowers are out;

In the three-glower lamp if one glower is out;

In the two-glower lamp if one glower is out;

In the one-glower lamp if the glower does not light.

3rd. After replacing the holder see that all the glowers light up. If they do not, the corresponding ballasts are burned out, and should be replaced.

4th. For the best service the holder and heater case (where used) should be cleaned when they become darkened.

Heaters

The heater tubes for the 220 volt Nernst Lamps are designed for 110 volts per tube. For the 110 volt one-glower Nernst Lamp the heater tubes are designed for 55 volts per tube.

In all one, two and three-glower holders there are two heater tubes connected in series, as shown in Fig. 9.

In all six-glower holders there are four heater tubes connected in parallel series, as shown in Fig. 10.

Mounting Heaters in Heater Porcelains, having round recesses at one end and slot recesses at the other

The two ends of the heater tube fit into recesses in the heater porcelain. On one end of the heater porcelain all these recesses are round, while on the other end they are more of the nature of slots open at the top.

Heater tubes are always inserted by placing them with the long lead in the round recess, and then slipping the other end into the slotted recess.

The ends of the heater tubes in the slotted recesses are always connected in series, as shown in Figs. 9 and 10.

At the point where the heater tubes are connected in series A, A, A′, Figs. 9 and 10, the leads are twisted tightly together, forming a good electrical contact, but care is taken not to put more strain on the heater leads than is necessary to hold the heater tubes in place.

Where the pairs are connected in parallel, B′ and C′, Fig. 10, they are simply twisted together, and both wires are inserted in the aluminum plug, which is then pinched on the wires.

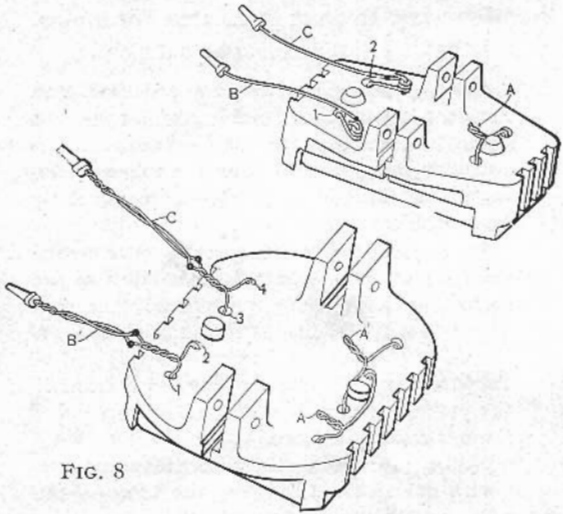

FIG. 8

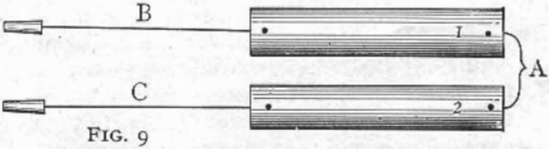

FIG. 9

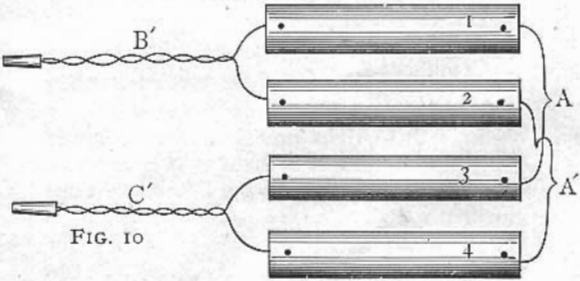

FIG. 10

HEATER TUBE CONNECTIONS

Mounting Heaters in Heater Porcelains, having slot recesses at both ends

These heater porcelains are provided with similar recesses at each end into which the ends of the heater tubes slip. In the six-glower porcelain it is immaterial how the tubes are inserted, provided all the ends having the long lead wires are placed together.

In the one, two and three-glower heater porcelains, wires will be found projecting from the bottom of the heater porcelain near one end. The ends of the heater tubes with the long leads should be placed in the recesses at this end of the porcelain and the lead wires wrapped around the projecting wires in order to hold this end of the heater tube in place.

At the points where the heater tubes are connected in series A, A, A′, Fig. 9 and Fig. 10, the leads are twisted tightly together, forming a good electrical contact, but care is taken not to put more strain on the heater leads than is necessary to hold the heater tubes in place.

Where the pairs are connected in parallel in the six-glower holder, B′ and C′, Fig. 10, they are simply twisted together and both wires are inserted in the aluminum plug, which is then pinched on the wires.

To Replace Burned-Out Heater Tubes

If the heaters of a one, two or three-glower holder fail to light up when the holder is plugged in the holder sockets, or if one pair of tubes of the six-glower holder fails to light up, one of the dark tubes is burned out.

Remove the heater porcelain by pulling out the glower plugs on one side, bending back the

glowers and pulling out the heater lead plugs and cotter pins.

Where there is only one pair of tubes (one, two or three-glower holder), determine which tube is open by holding one of the testing lamp terminals on the series connection of the heaters (A, Fig. 9), and then touch successively the other heater leads B and C with the other testing lamp terminal.

In the case of the six-glower holder, untwist the series connection (A, Fig. 10) of the dark pair (one and three), and then determine which of the tubes, one or three, is burned out by testing out each one successively.

Remove the defective heater by cutting the lead wires close to the plug and untwisting the leads on the parallel end. Replace it with a good tube, connecting it up according to the directions given above.

When the glower in the single-glower lamp burns out the lamp should be turned off, otherwise it runs on the heaters and thus not only takes current without giving light, but, under these conditions, the heater tubes deteriorate.

To Clean the Holder

1st. Scrape off the coating on the heater porcelain with a scraper made from a sharpened piece of wood. To do this it is not necessary to remove the glowers, and it is not necessary to remove the coating on the heater porcelain under the heater tubes except when the tubes are taken out to be replaced.

2nd. Use a camel's hair brush to brush off the loose paste from the heater porcelain and the deposit of black on the ends of the heater

tubes. Do not allow particles of paste to collect on the glowers.

3rd. Mix the heater porcelain paste with water to about the consistency of cream, and apply a coating to the heater porcelain. *Do not coat the heater tubes.*

4th. Allow the holder to dry in the air for 1½ hours before starting it up. The heater porcelain paste does not set on standing, so that it may be kept mixed ready for use.

Glowers

Glowers should be spaced $\frac{5}{32}''$ apart center to center in the six-glower holders, and $\frac{1}{8}''$ apart center to center in the two and three-glower holders.

Glowers should be spaced about $\frac{3}{32}''$ to $\frac{1}{8}''$ from the heater tubes.

Glowers must have about $\frac{1}{16}''$ end play to allow for expansion and contraction. By end play is meant play parallel to the length of the glower. Glower leads should not rub or bind on the heater porcelain so as to put the glower under stress or prevent it from freely expanding and contracting.

When properly adjusted the glowers should light in about thirty seconds.

All .4 ampere alternating-current glowers for lamps of the 220 volt type are interchangeable among the one, two, three and six-glower lamps as indicated in the following table of voltages.

For instance, consulting the table it will be seen that glowers for a 210 volt, six-glower lamp may also be used in a 212 volt, three-glower, 220 volt, two-glower, or 226 volt, single-glower lamp.

From the table it will also be seen that all glowers for six-glower lamps between 200 and 234 volts may be used in either three, two or one glower lamps of different voltages.

Table of Interchangeable Glowers

VOLTAGE OF LAMPS			
6 Glower	3 Glower	2 Glower	1 Glower
			200
			202
			204
		200	206
		202	208
		204	210
		206	212
	200	208	214
200	202	210	216
202	204	212	218
204	206	214	220
206	208	216	222
208	210	218	224
210	212	220	226
212	214	222	228
214	216	224	230
216	218	226	232
218	220	228	234
220	222	230	236
222	224	232	238
224	226	234	240
226	228	236	
228	230	238	
230	232	240	
232	234		
234	236		
236	238		
238	240		
240			

Heater Cases

The heater case is the small inner globe which is only used in the multiple glower lamps in connection with the dome shade.

When the inside of the heater case becomes darkened near the neck it should be cleaned.

The cleaning brush provided for this purpose is used dry and should be mounted on a spindle run at about 2500 revolutions per minute.

Further particulars concerning the operation and maintenance of the Nernst Lamp will be cheerfully furnished upon request.

Globes

The screws holding the globe should not be screwed up too tight. Allowance should be made for contraction and expansion.