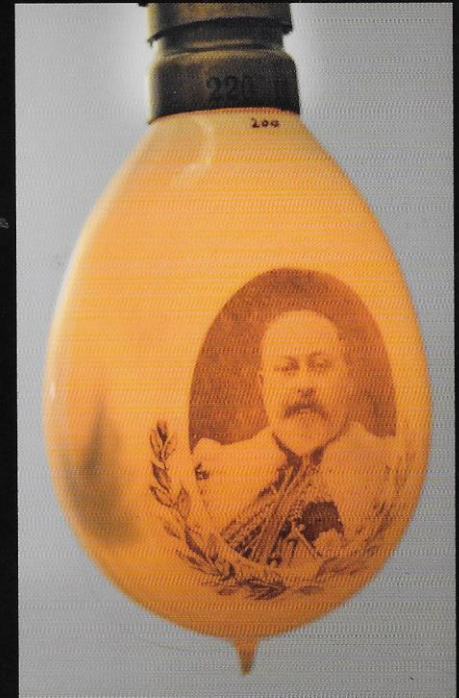
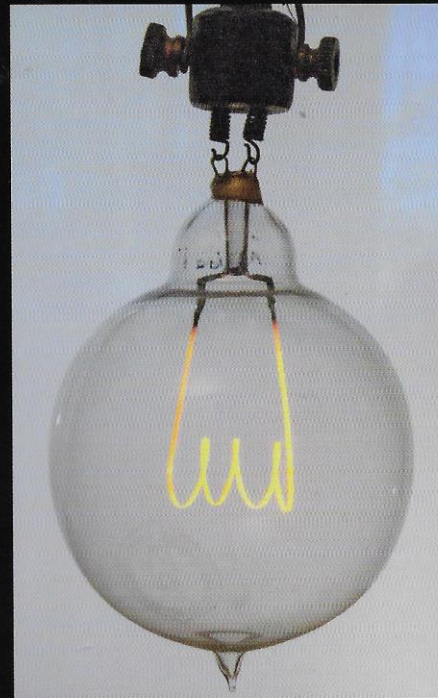
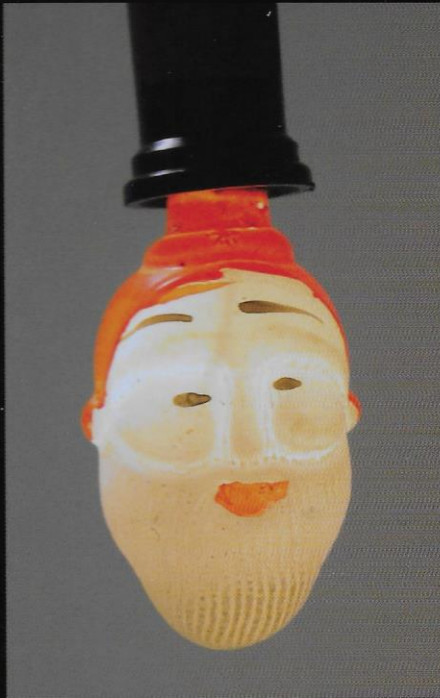


RAYS OF LIGHT

A comprehensive history of the incandescent light bulb

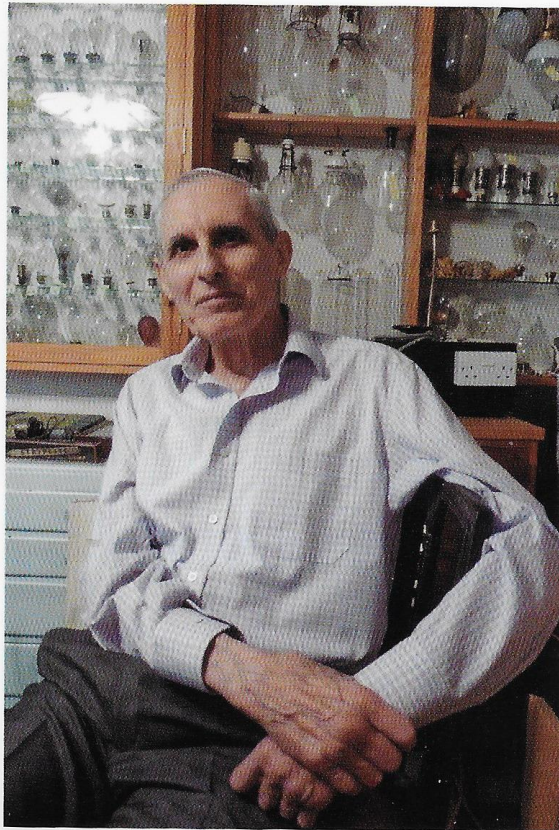


Ray Tye

Rays of Light outlines the development of the incandescent electric lamp from its beginning in the late 1870s through to its demise facing competition from the compact fluorescent lamp, and the rapid development of the LED lamp.

Many books have been written on the subject detailing the technical developments and relating to a particular company's development but this is an attempt to describe the early production methods, the effect of restrictive Acts of Parliament and patent restrictions.

The photographs of lamps, some from small and little-known early makers show many lit only possible as they form part of the author's collection which he donated to the National Trust for permanent display at Cragside, Rothbury, Northumberland, the former home of Lord Armstrong, and the site of the first major installation of Joseph Swan's incandescent electric lamps in December 1880. It is hoped the photographs will assist collectors to identify some of the lamps in their collections that bear little or no markings.



Ray Tye, a retired business archivist, was born in Kew, Richmond, Surrey, lived all his life in the London area spending most of his working life in the City of London. An avid collector from childhood, he started with pre-war cigarette cards and London Transport bus and tram tickets and later British coins. He became fascinated as the war ended with the reintroduction of street lighting, and as councils replaced their gas lighting with electric lamps he scoured the council scrapyards for redundant gas lanterns.

From 1971 he obtained several important collections of early electric lamps resulting in an extensive collection from 1879 to modern times.

He has appeared in several TV programmes illustrating the development of artificial gas and electric lighting using examples from his collection. He gives illustrated talks to various organisations including the National Trust, Historic England and other conservation bodies.

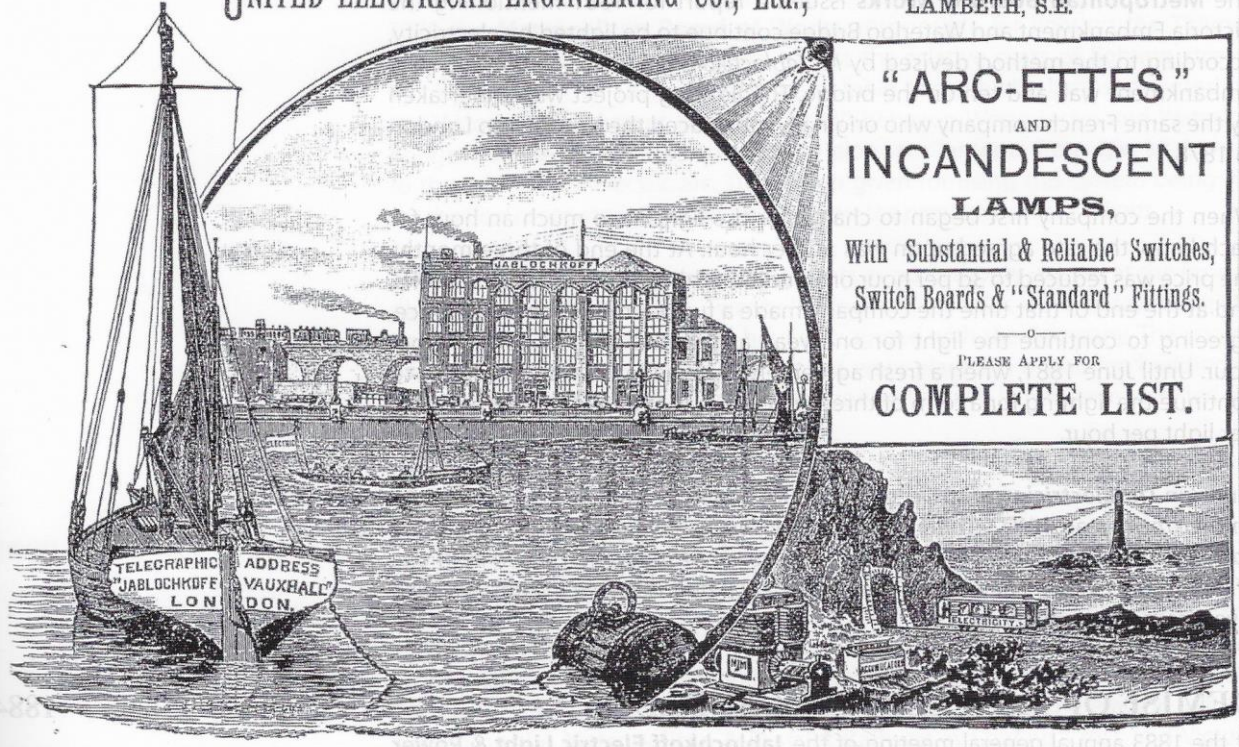
All the photographs of bulbs in the book sections are from his collection which he donated to the National Trust for permanent display at Cragside, Rothbury, Northumberland the former home of Lord Armstrong, and the site of the first major installation of Joseph Swan's incandescent electric lamps in December 1880.

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1881
 UNITED ELECTRICAL ENGINEERING CO., Ltd., 36, ALBERT EMBANKMENT,
 LAMBETH, S.E.

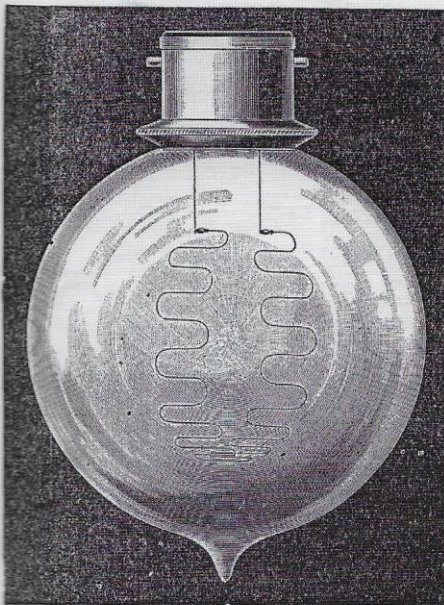


"ARC-ETTES"
 AND
**INCANDESCENT
 LAMPS,**
 With Substantial & Reliable Switches,
 Switch Boards & "Standard" Fittings.
 ———
 PLEASE APPLY FOR
COMPLETE LIST.

United Electric Engineering Company advert for Arc Lamps from *The Electrician*, December 1888.

ZURICH Incandescence Lamp Co.

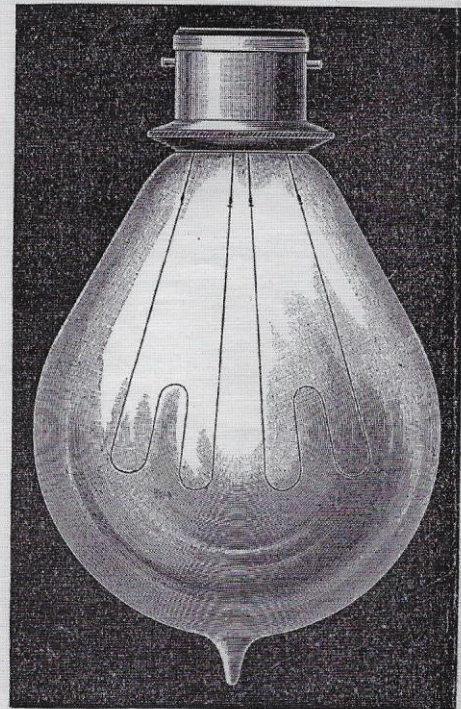
47, Victoria Street, London, S.W.

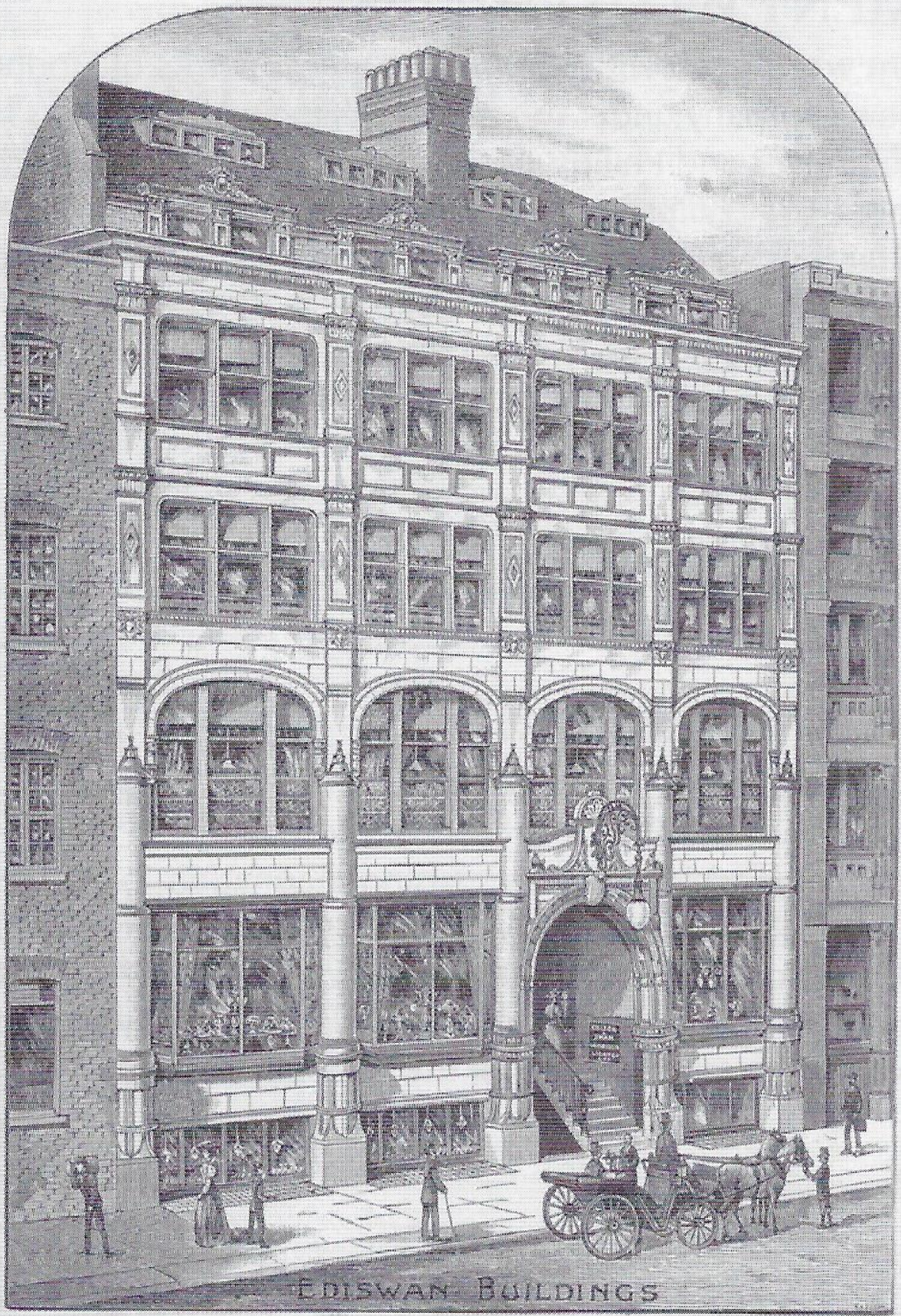


"Stearn"
High
Voltage
Lamps.

200 to 230 VOLTS.
 6, 8, 16, 25, 32, 50 and 100
 candles. Efficiency, 3.5 to 4
 watts per candle.

**Write for Prices,
 &c.**





EDISWAN BUILDINGS

EDISWAN BUILDINGS, 36 & 37, QUEEN STREET, LONDON, E.C.

Made in
England.

THE
ROBERTSON
INCANDESCENT

**ELECTRIC
LAMP**

Long
Life

Saves
Current.

The advertisement features a central illustration of a glowing incandescent lamp. Above the lamp, a moon with a human-like face is depicted against a dark, cloudy sky. The lamp is surrounded by radiating lines, suggesting light and heat. The text is arranged around the lamp, with 'THE ROBERTSON INCANDESCENT' on a banner across the top, 'ELECTRIC LAMP' in large, stylized letters below it, and 'Long Life' and 'Saves Current.' at the bottom corners. The entire scene is enclosed in a decorative border.

THE GENERAL ELECTRIC COMPANY, LIMITED

69 & 71, Queen Victoria Street, LONDON, E.C.

THE LARGEST MANUFACTURERS OF ALL ELECTRICAL SUPPLIES

WRITE FOR CATALOGUE, 500 pages.

Royal Ediswan "Pointolite" Lamp

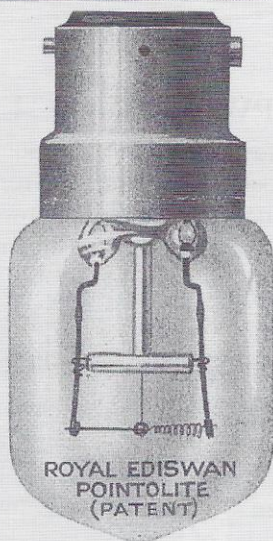


Fig. 1.
30 c.p. 45 amp.
Galvanometer
Type, for use
with Reflecting
Galvanometers.



Fig. 2.
100 c.p., 1.35
amp. Standard
Type, 3in. Bulb,
for Optical Pro-
jection Lanterns



Fig. 3.—100 c.p., 1.35 amp. Fixed
Focus Type, 2in.-2½in. Bulb, for use
with Parabolic Reflectors.

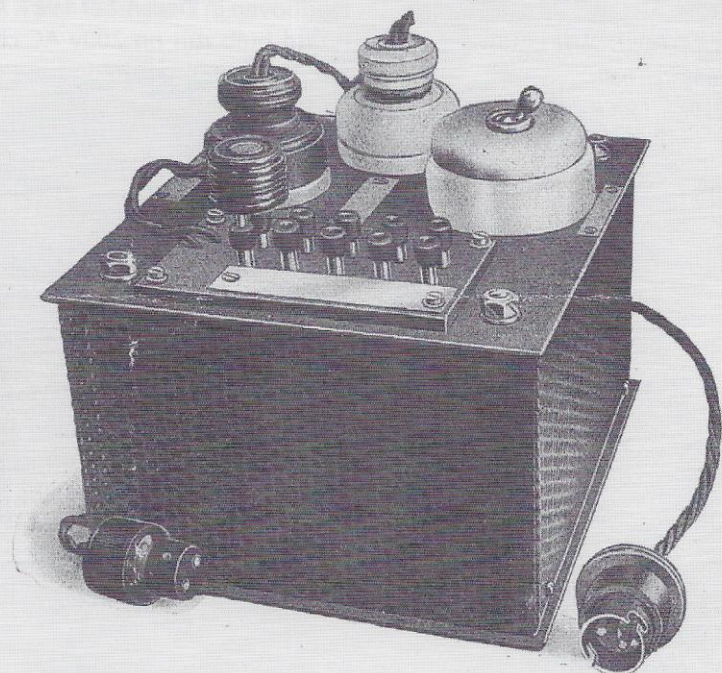
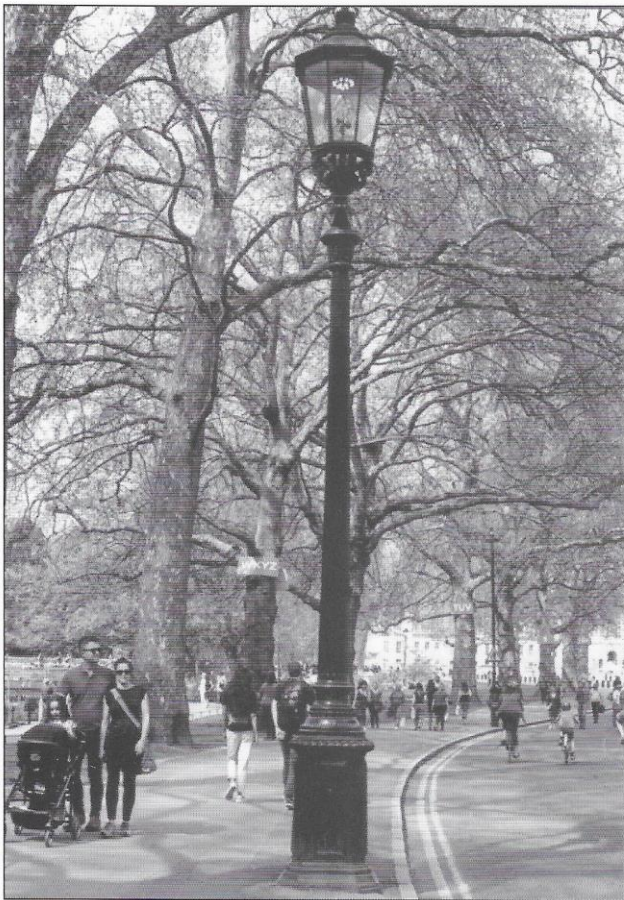


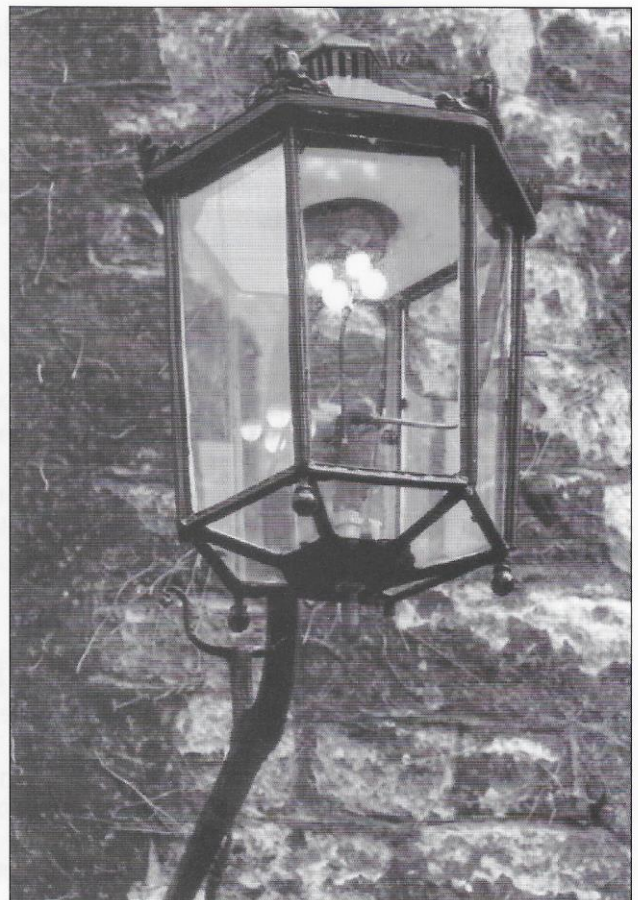
Fig. 4.—Standard Resistance Box for 100 c.p. Lamp,
adaptable for all circuits from 100 v. to 240 v.

Another improvement introduced is the standardising of the position occupied in the bulb by the light-giving electrode.

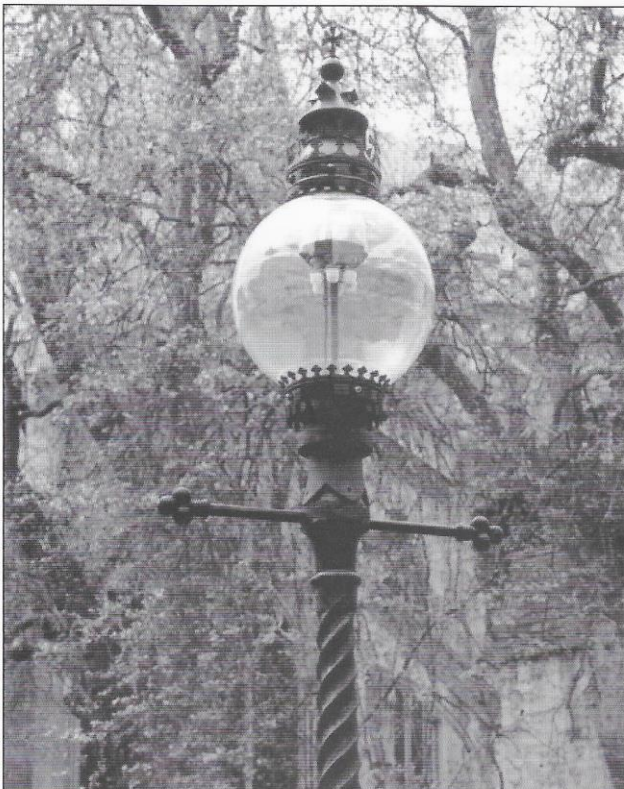
This position is fixed by the use of a device in the manufacture of the lamps, thus, by ordering lamps with "fixed" electrodes, the user may replace a lamp without altering the external focussing apparatus (see Fig. 3).



Erected 1920s. Large cluster of mantles.
St James's Park, Westminster. April 2018.



Westminster School. April 2018.



New '6 light' gas burner on barley sugar column. Reproductions of lamps
erected around Houses of Parliament in 1850s. Installed 2010-15.



1910s Sugg 2/4 light 'Grosvenor' lamp.
Cockpit Steps, St James's, Westminster. April 2018.

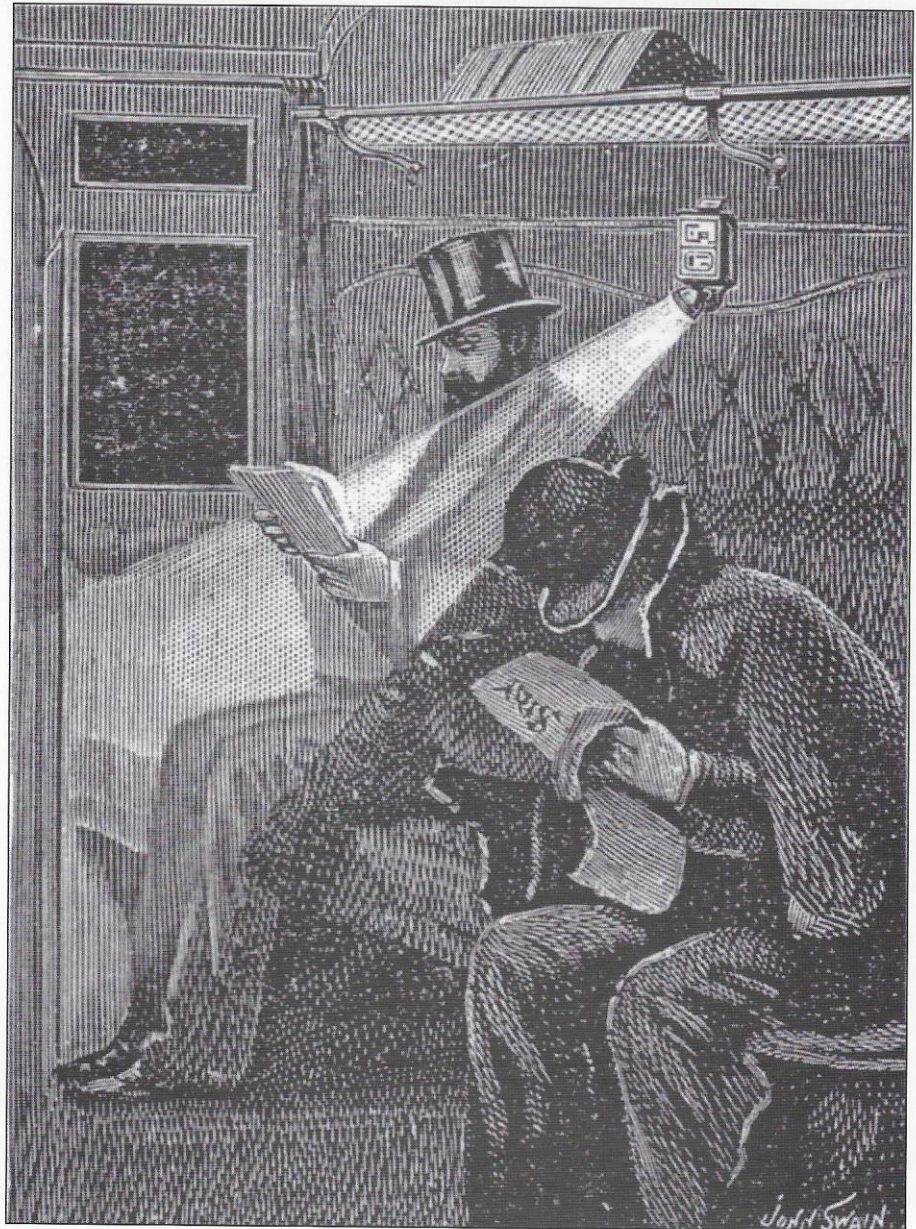
collected from the Daily Mirror Co. & sold to transport agencies plus a profit of the 1930s and one from the same period with the same design but with a different...

1901

1923

1924

1927



ELECTRIC BATTERY READING LAMP
For use by travellers on the 'Cut & Cover' (sub surface) sections of line on the Metropolitan & District Railway in London. One penny in the slot provided 30 minutes of additional lighting.
Electric trains were introduced in 1903 along with a new electro pneumatic signalling and points system designed by George Westinghouse which is now being replaced in 2019 by the latest electronic system.

...the process of the railway and being the same as the one...

ZURICH INCANDESCENCE LAMP CO.

47,1

VICTORIA ST., WESTMINSTER, S.W.

.....

Director :

C. H. STEARN,

Joint Inventor

with

Mr. J. W. SWAN,

of the modern

Incandescence

Lamp.

~~~~~

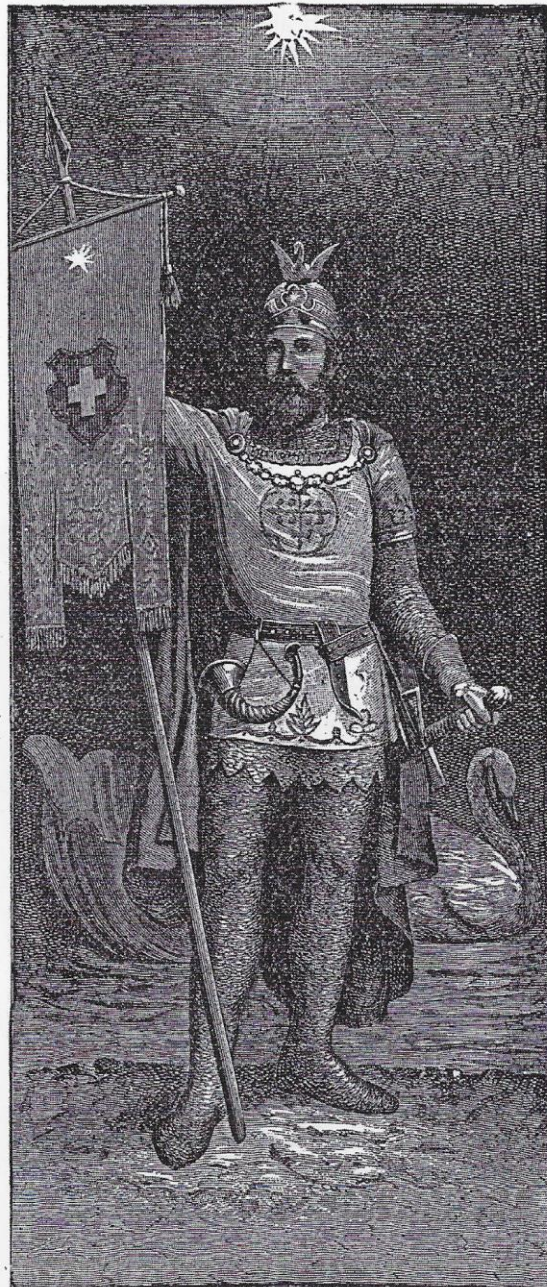
Lamps delivered by

postal packets to all

parts of the

United Kingdom.

.....



.....

Lamps of Long

Duration with

larger consumption

of power, or of

greater economy

and Shorter

Duration, delivered

as required.

~~~~~

Terminals affixed

as ordered,

to suit any

holders of the

current types.

~~~~~

The Lamps are

manufactured under

Mr. STEARN'S

Personal Direction

by an English Staff.

.....

**ALL LAMPS ACCURATELY CLASSIFIED IN VOLTAGE & CANDLE-POWER**

The Company are now supplying

**STEARN'S NEW CENTRAL STATION LAMPS**

at 2.7 watts per candle, "for use where Economy of Current is the first consideration." These Lamps effect a saving of **10s. 2d.** per 1,000 hours on a 16-c.p. Lamp as compared with the ordinary 4-watt Lamps, price of current being 7d. per Board of Trade Unit.

**ORDERS FOR LARGE QUANTITIES OF LAMPS PROMPTLY EXECUTED'**



# Light for Production



Do you realise the situation this country faces?

Do you realise the imperative demand for LIGHT—for LIGHT in thousands of Works and Factories where light has never played an important part before?

TO-NIGHT thousands of great manufacturing plants must push production at top speed—and they must have BETTER LIGHT to do it by.

Give the Workers GOOD LIGHT. Give them the light of

# MAZDA

HALF-WATT TYPE  
Electric Lamps

We are Specialists in Good Lighting.  
We design and make Scientific Lighting Appliances as well as the Lamps.  
Lighting Advice and Plans free.

## The British Thomson-Houston Co. Ltd.

MAZDA HOUSE, 77 UPPER THAMES STREET, LONDON, E.C. 4

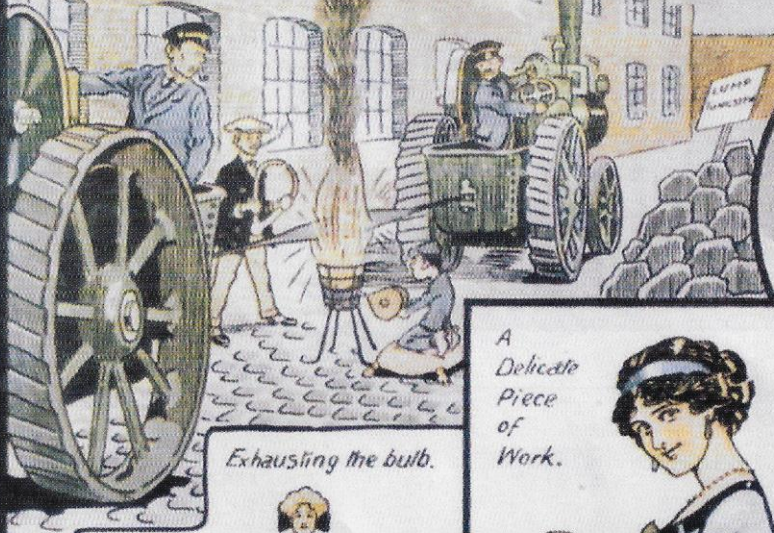
1914 MAZDA B.T.H., RUGBY.  
'Half watt' tungsten gas-filled coiled filament lamp.  
Designed to replace arc lamps and gas lighting in factory workshops.  
1,000w (2,000 cp) 200v GES 6½" x 13"



# MAKING THE "WOTAN" (ONEWATT) LAMP

(FROM A HUMOROUS POINT OF VIEW)

*Drawing the filament.*



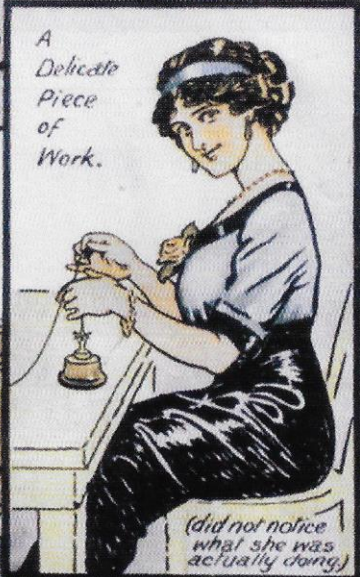
*Blowing the bulb.*

*Exhausting the bulb.*



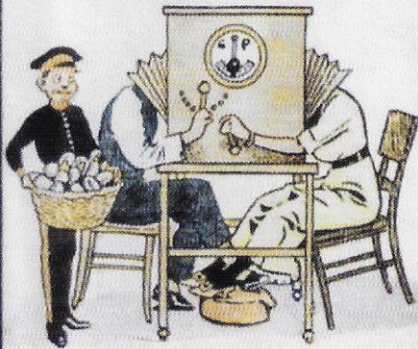
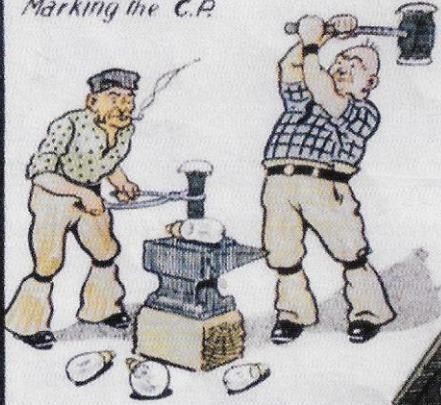
*N.B. Sketched immediately after visit.*

*A Delicate Piece of Work.*



*(did not notice what she was actually doing)*

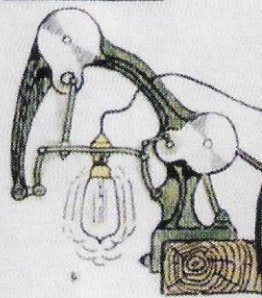
*Marking the C.P.*



*The Photometric Test. (conducted in camera)*

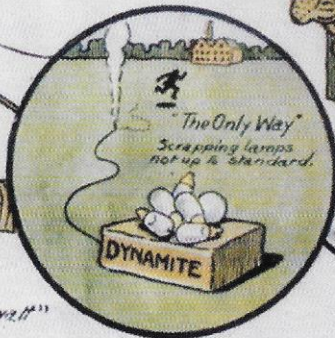


*The Life Test*



*The Vibration Test.*

*What one but a "one watt" would pass this)*

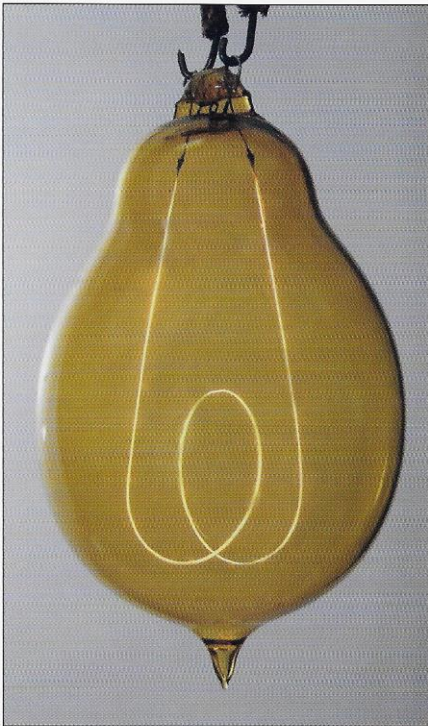


*J. MacBean  
1911*

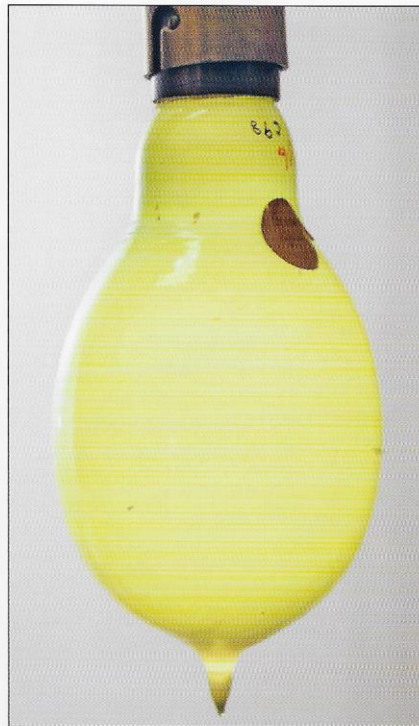
1911 SIEMENS BROTHERS DYNAMO WORKS, Dalston, London. Advertisement for the new WOTAN drawn wire lamp. (Page 388)



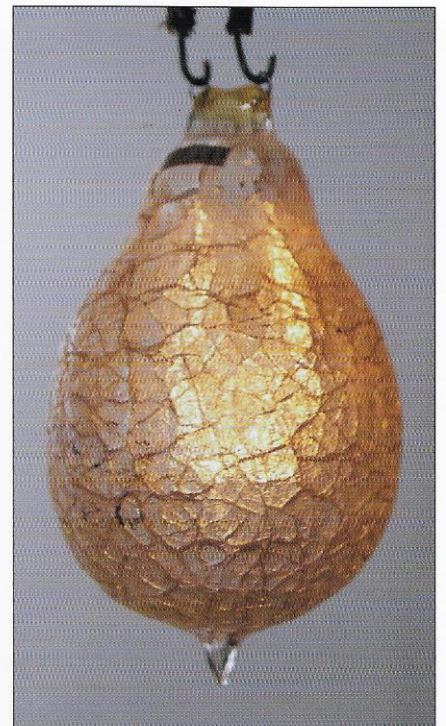
## Carbon Filament Lamps



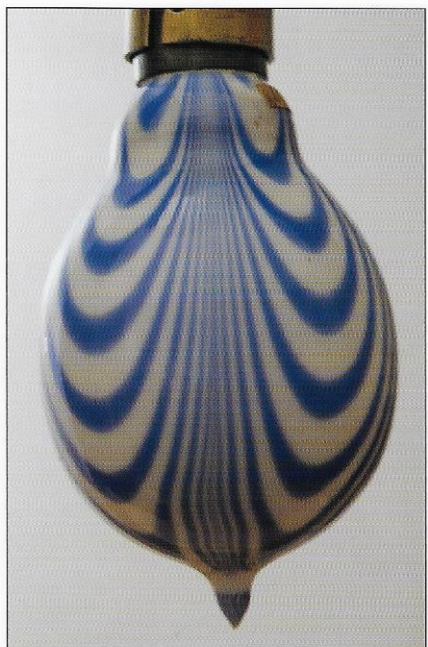
1886-1893 'THE EDISON SWAN'; Edison & Swan United, England. "Fancy Lamp". Two loop carbon filament, tip exhaust. Platinum eye contacts (bottom loop) 100v 16cp 2 1/4" x 3 3/4" (Pages 33 & 205)



1886-1893 'THE EDISON SWAN'; Edison & Swan United, England. "Fancy Lamp". Opal bulb with green glass overlay. Tip exhaust. Brass tube bayonet cap 7/8" diameter. Arc contact plates, Plaster of Paris insulation 110v 16cp 2 1/4" x 4 1/4" (Pages 33 & 205)



1886-1893 'THE EDISON SWAN'; Edison & Swan United, England. "Fancy Lamp". Ex E. & S. Museum, Ref. D11. Iced lamp. Weight 5 1/2 ozs. Tip exhaust. Broken platinum loop contacts replaced. 40v 8cp 2 1/4" x 3 3/4" (Pages 33 & 205)



1886-1893 'THE EDISON SWAN'; Edison & Swan United, England. "Fancy Lamp". Opal bulb striped with blue. Ex E. & S. Museum, Ref. D14. Tip exhaust, brass collar bayonet cap, Plaster of Paris insulation. Arc shaped contact plates. 50v 16cp 2 1/3" x 4" (Pages 33 & 205)



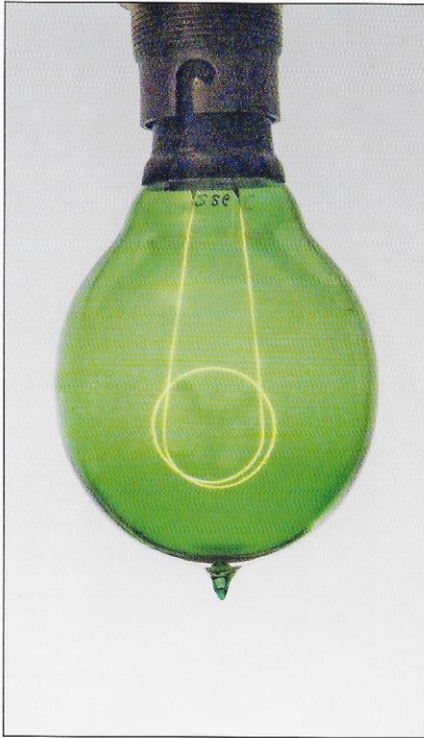
1886-1893 'THE EDISON SWAN'; Edison & Swan United, England. "Fancy Lamp". Diamond design on bulb. Tip exhaust. Brass tube bayonet cap insulated with Plaster of Paris, arc contact sole plates. Low voltage. 2 1/4" x 4" (Pages 33 & 205)



1886-1893 'THE EDISON SWAN'; Edison & Swan United, England. "Fancy Lamp". Diamond design moulded in glass. The bulb has been opened and tubular carbon filament lamp inserted. Original brass tubing bayonet cap retained, Plaster of Paris insulation and arc contacts restored. Rating N/A. 2 1/3" x 4" (Pages 33 & 205)



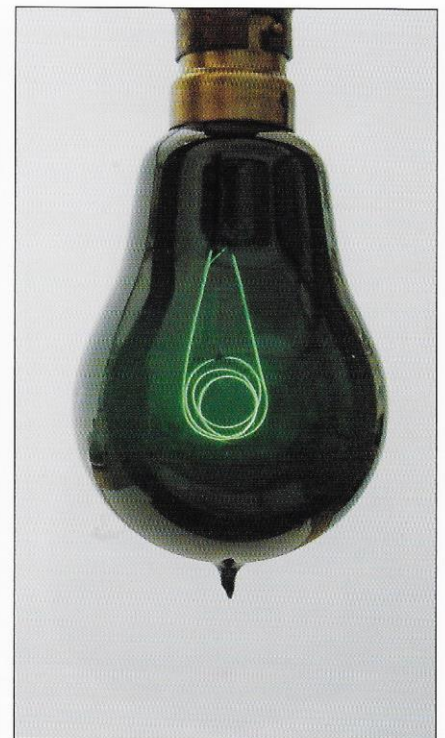
## Carbon Filament Lamps



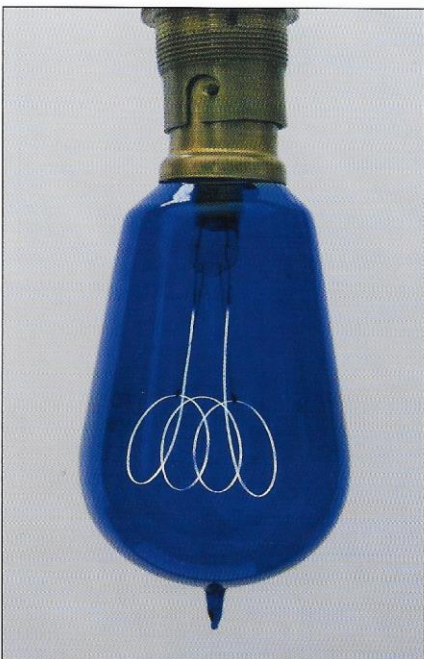
1905-1910 ROBERTSON, G.E.C., London. Two loop filament, tip evacuation. BC base, Standard Vitrite insulation and contact plates. 100v 8cp 2¼" x 3¾" (Page 56)



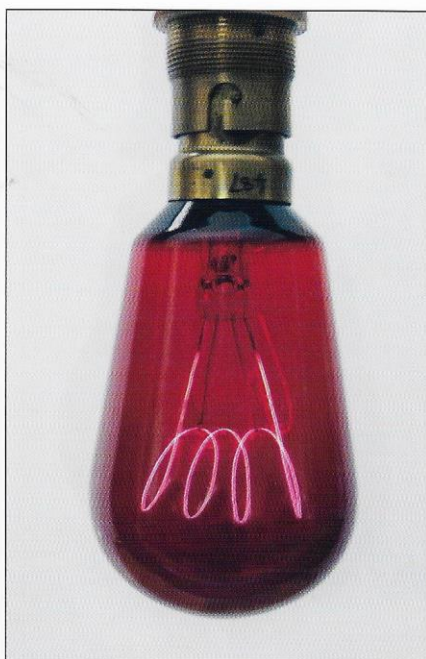
1905-1910 ROBERTSON, G.E.C., London. Two loop filament, tip evacuation. BC base, Modern Vitrite insulation and contact plates. 100v 8cp 2¼" x 4" (Page 56)



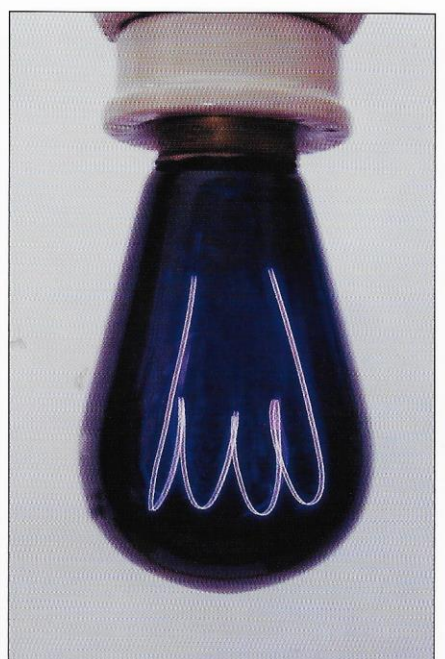
1910s ROBERTSON, G.E.C., London. Five loop filament, tip evacuation. BC base, Modern Vitrite insulation and contact plates. 210v 5cp 2½" x 4½" (Page 56)



1920s ROBERTSON, G.E.C., London. Four loop filament, tip exhaust. BC base, Standard Vitrite insulation. 230v 16cp 2½" x 4½" (Page 56)



1920s ROBERTSON, G.E.C., London. Four loop filament. Stem tube exhaust and seal. Modern BC base. 230v 16cp 2¼" x 4½" (Page 56)

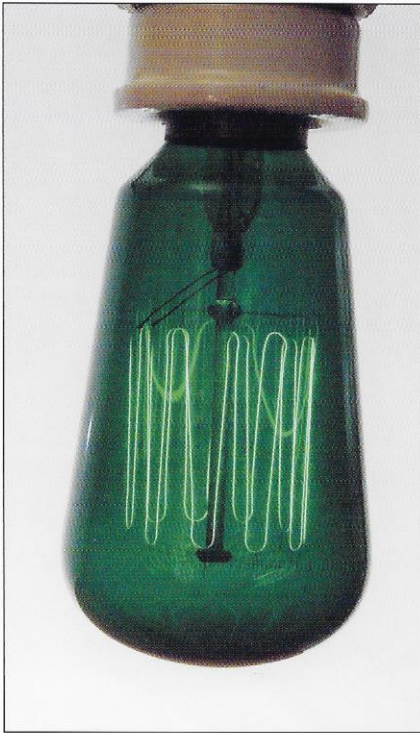


1930s UNKNOWN EUROPEAN MAKER. Four loop filament. Stem tube evacuation and seal. Modern ES base. 240v 25w 2⅛" x 4⅜"

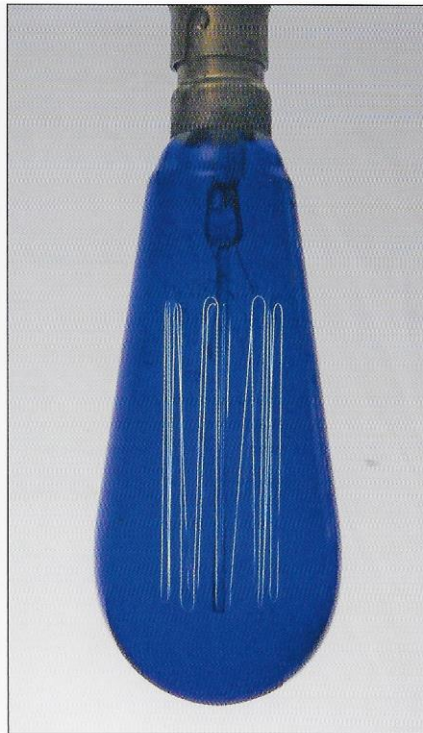


## Tungsten Filament Lamps

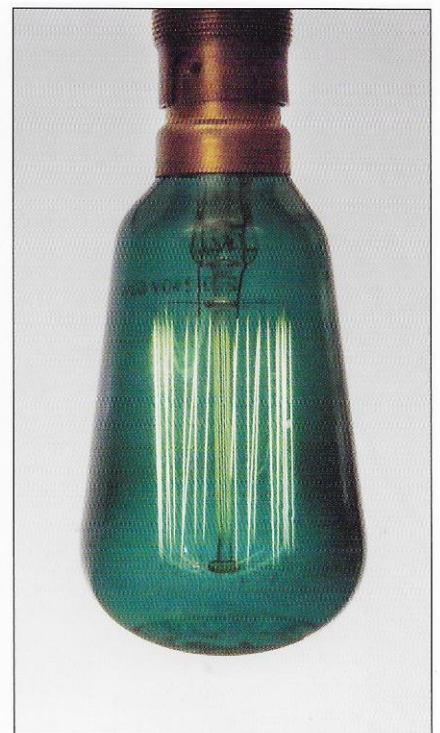
Main: Circuit decoration lamps



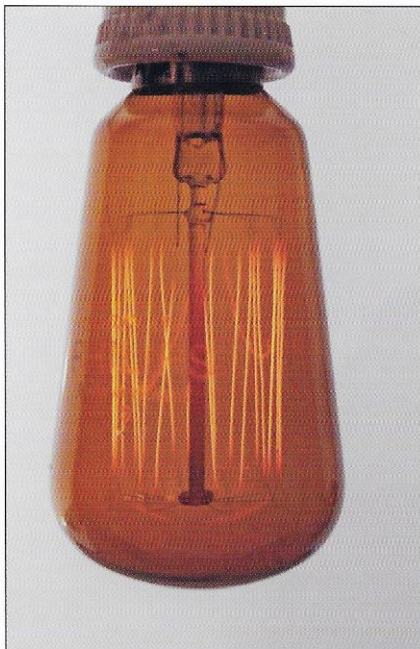
1925-1939 PHILIPS, Holland.  
Drawn wire squirrel cage filament,  
ES. Modern stem tube exhaust.  
240v 25w 2¼" x 4¼"



1925-1939 OSRAM G.E.C., London. Drawn  
wire type used for Ultra Violet health  
lamps. Drawn wire, stem tube exhaust. BC  
240v 60w 2½" x 5½"



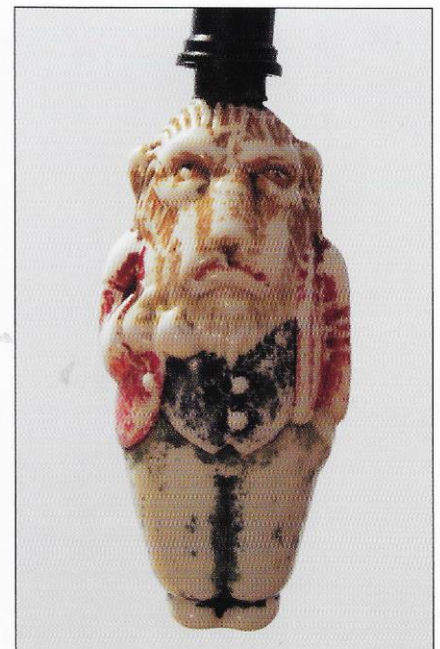
1925-1939 ROYAL EDISWAN,  
London. Made for Victoria Railways.  
Drawn wire. Stem tube exhaust, BC.  
240v 60w 2½" x 4½"



1930s PHILIPS, Holland. Squirrel cage  
or Navigation type drawn tungsten  
wire lamp. Stem tube exhaust. ES.  
240v 60w 2¼" x 4¾"



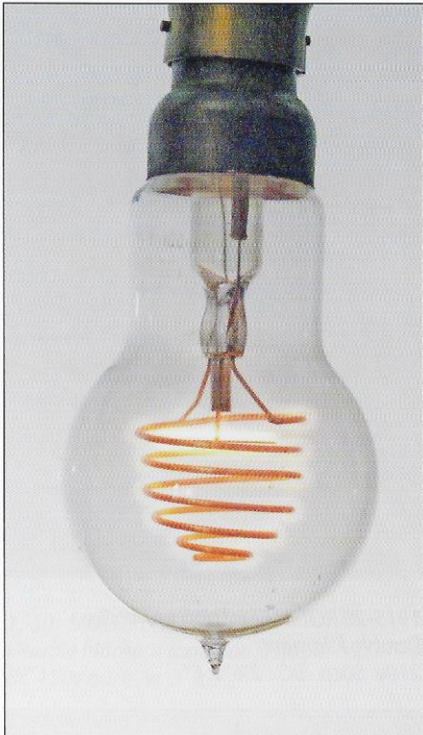
1920s GENERAL ELECTRIC, NATIONAL  
MAZDA, U.S.A. Drawn wire squirrel  
cage filament. Tip exhaust, ES cap.  
No rating label. 2¾" x 5½"



1930s JAPANESE decoration 'figural'  
lamp. One of a huge range of designs.  
MES From series working decoration set.  
14v 1¾" x 4"



Neon discharge lamps



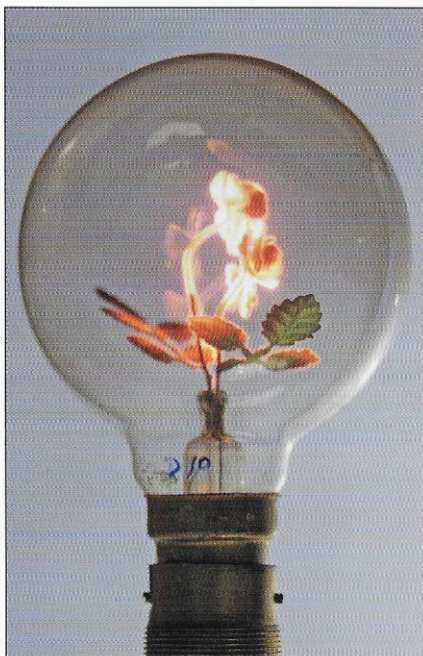
1922-1926 G.E.C. OSGLIM. 'Beehive' neon lamp. Tip exhaust, dumet in pinch. Used as nursery or hospital night light. BC 240v 5w 2¼" x 4¾"



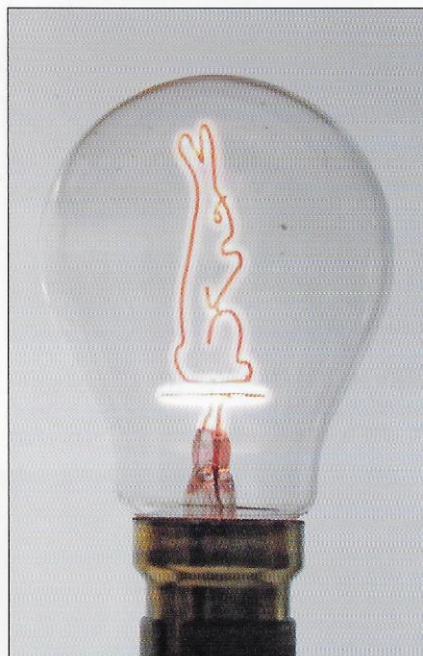
1922-1925 OSGLIM, G.E.C., London. Neon indicator. Used in cinemas and theatres to indicate seat locations, room numbers etc. BC 240v 5w 2¼" x 4¼"



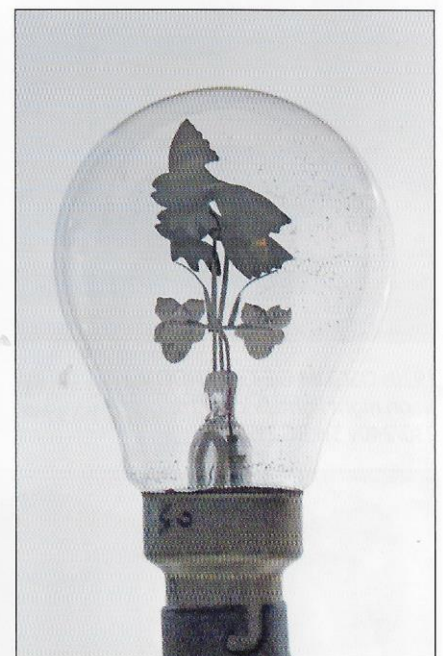
1930s UNIDENTIFIED EUROPEAN MAKER. Neon rose in tubular lamp. Stem tube seal. ES 1¼" x 5½"



1930s UNKNOWN MAKER. Neon decoration lamp of rose in blossom on branch. Stem tube exhaust with dumet in pinch. ES High voltage 1¼" x 5½"



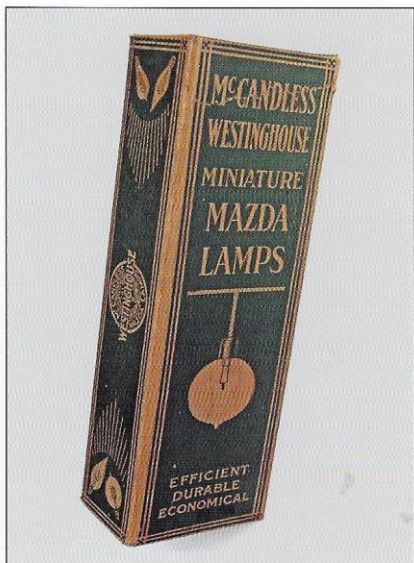
1950s UNKNOWN MAKER. Decoration neon lamp outlining a rabbit. Stem tube exhaust, dumet in pinch. BC High voltage 2½" x 5½"



1950s ATLAS. Neon decoration lamp, flowers. Stem tube exhaust, dumet in pinch seal. BC 200-250v 2½" x 4¼"



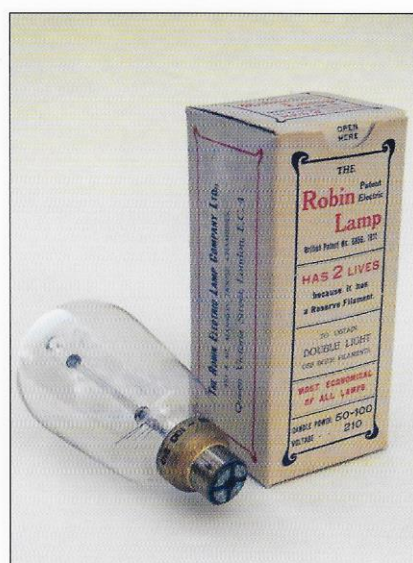
# Lamp cartons 1905-1930s



1912-20 Mc CANDLESS USA  
Carton contains five bulbs  
9v 18cp 3" x 11"



1912-15 FALK STADELMANN 'EFESCA.  
Import from Europe. Tungsten drawn wire  
BC 2 3/4" x 6 1/2"



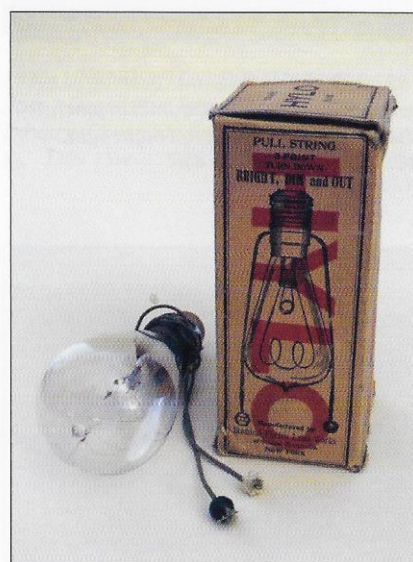
1915-20 ROBIN ELECTRIC LAMP Co.  
Double Filament  
210v 50cp BC 2 1/2" x 6"



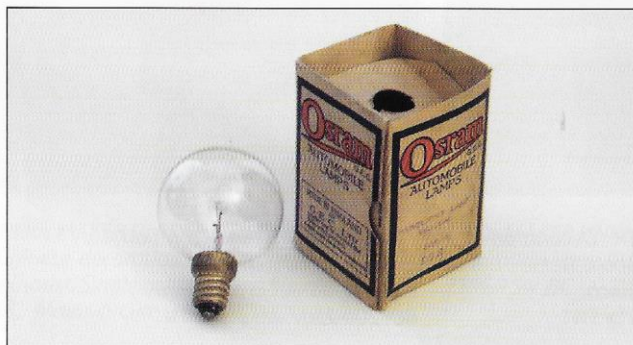
1920s OSGLIM G.E.C., LONDON  
Neon night light. Price 3/1d.  
230/240v 5w BC 2 1/2" x 5"



1930s MAZDA ENGLAND  
Coiled coil tungsten  
BC 3 1/2" x 6"



1905-15 ECONOMIC 'HYLO', NEW YORK, USA  
Bright, dim & off positions  
ES 2 1/2" x 6"



1920s OSRAM G.E.C., LONDON  
Automobile headlamp BCP MES 2 1/4" x 3"



1920s PANSY. EUROPEAN MAKE  
230v 60w BC 2 1/4" x 5"



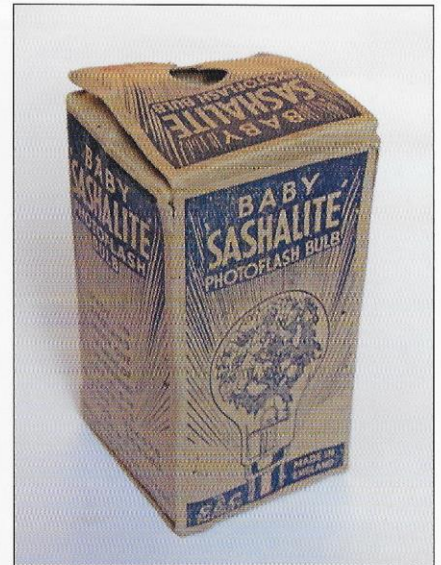
# Lamp cartons 1930s –1940s



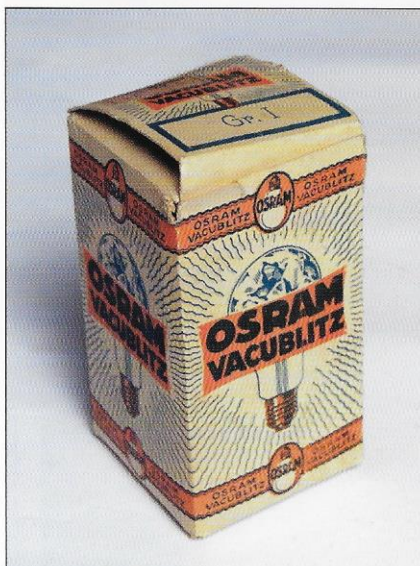
1930s MULTIPLEX BRITISH  
Double filament lamp, adjustable cap  
BC 150v 60/60w 3" x 5"



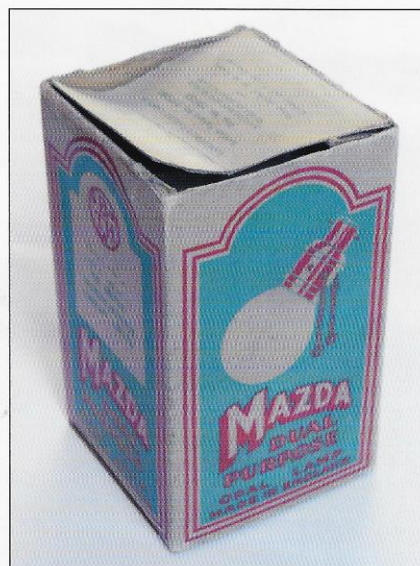
1930s DUOFIL BRITISH ELECTRYDE CORPN.  
Double filament, adjustable cap



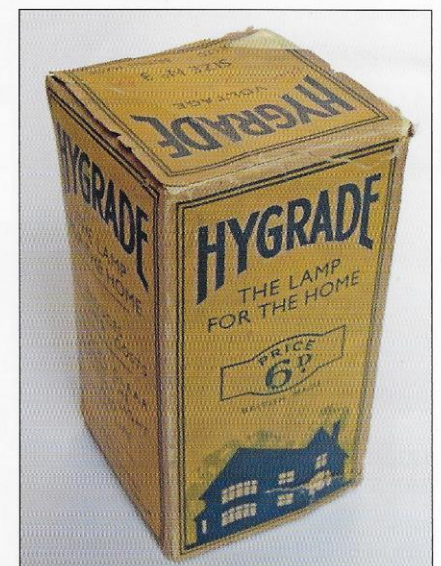
1930s GEC BABY SASHALI  
Photoflash bulb 2½" x 5"



1930s OSRAM 'VACUBLITZ'  
German flashbulb 2¼" x 4"



1930s MAZDA BTH  
Dual purpose lamp with pull cords  
2¾" x 4½"



1930s 'HYGRADE' BRITISH  
Price 6d. (2½p)



1930s B.E.L.L. MAXTRIP 2 LONDON  
Picture light end contacts 12" x 1¾"



1930s B.E.L.L. MAXTRIP, London  
Linear lamp end caps 11" x 2½"



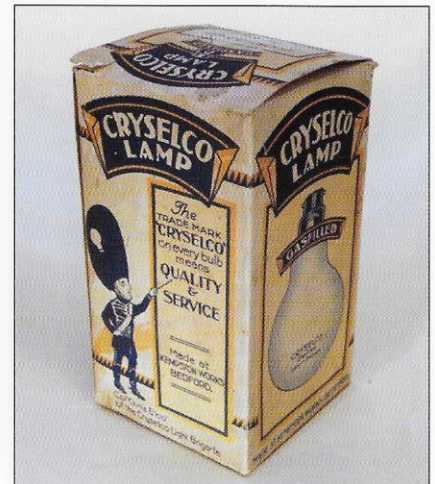
Lamp cartons 1930s – 1940s



1930s SILVER FOX (JAPAN)  
Dundas Fox import  
3½" x 5½"



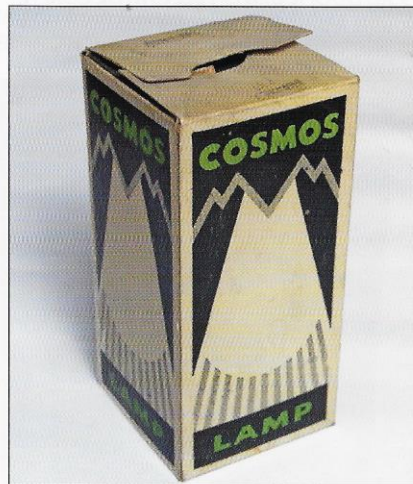
1930s FENBO. J ISMAY & SON LONDON  
Chrystal Glass bulb  
Price 1/11d. 3½" x 7"



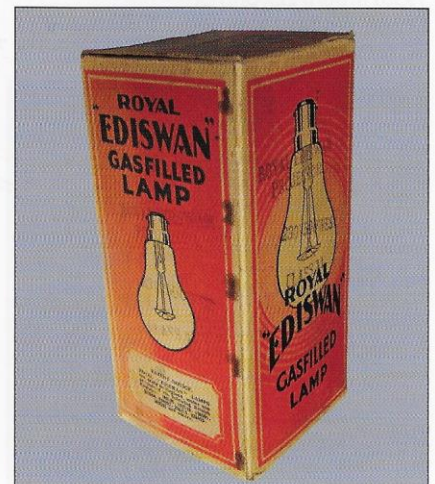
1950s CRYSELCO, ENGLAND  
Gas filled tungsten lamp  
BC 3" x 5¾"



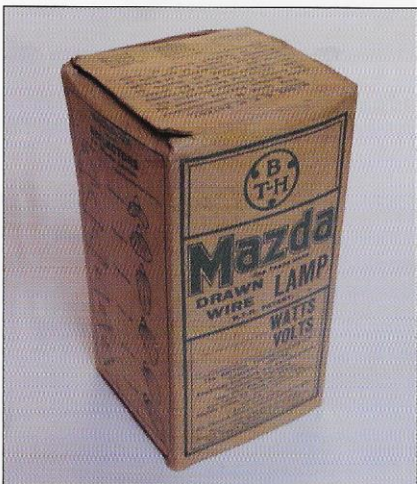
1930s CROMPTON PARKINSON, ENGLAND  
240v 60w 2½" x 4"



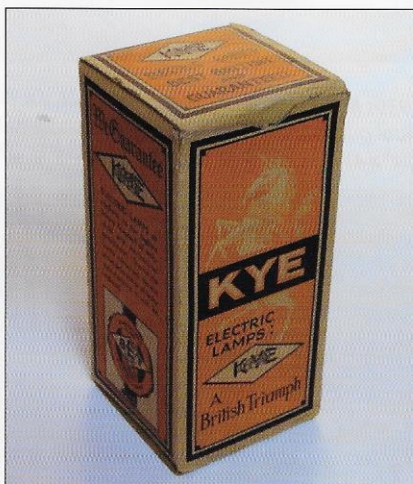
1930s COSMOS, METROPOLITAN VICKERS  
Brimsdown 240v 60w 3½" x 7"



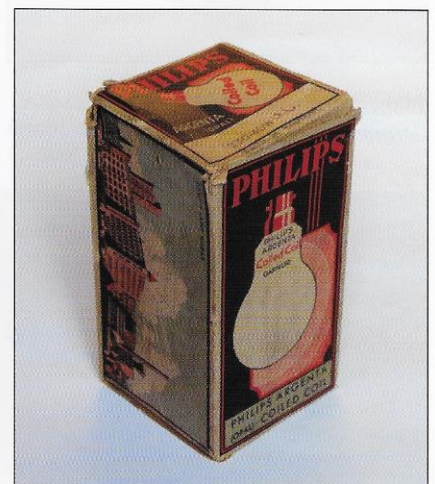
1930s ROYAL EDISWAN, ENGLAND  
Gas filled tungsten 3¾" x 7"



1920 MAZDA BTH, ENGLAND  
Well packaged tungsten twisted  
candle lamp  
77v 17w SBC 3" x 6"



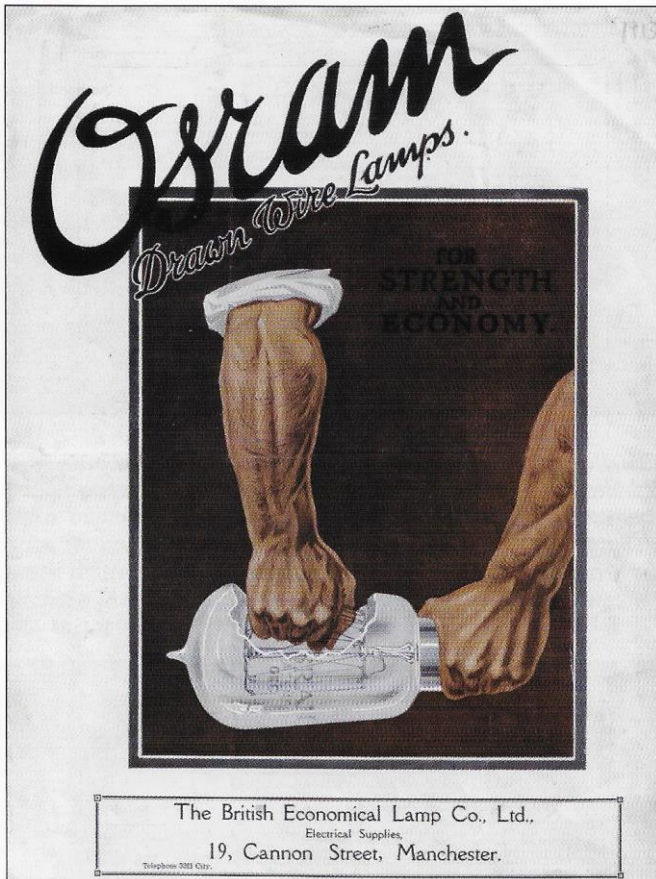
1930s KYE, B.E.T. HAYES  
Drawn wire vacuum tungsten  
240v 60w BC 2½" x 5"



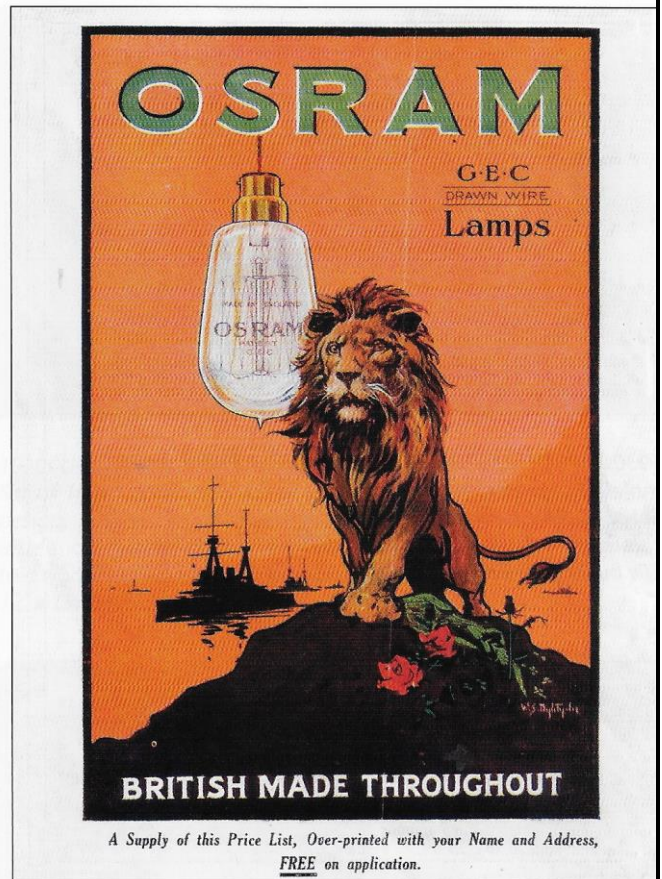
1930s PHILIPS, HOLLAND  
Coiled Coil Tungsten  
BC 3" x 7"



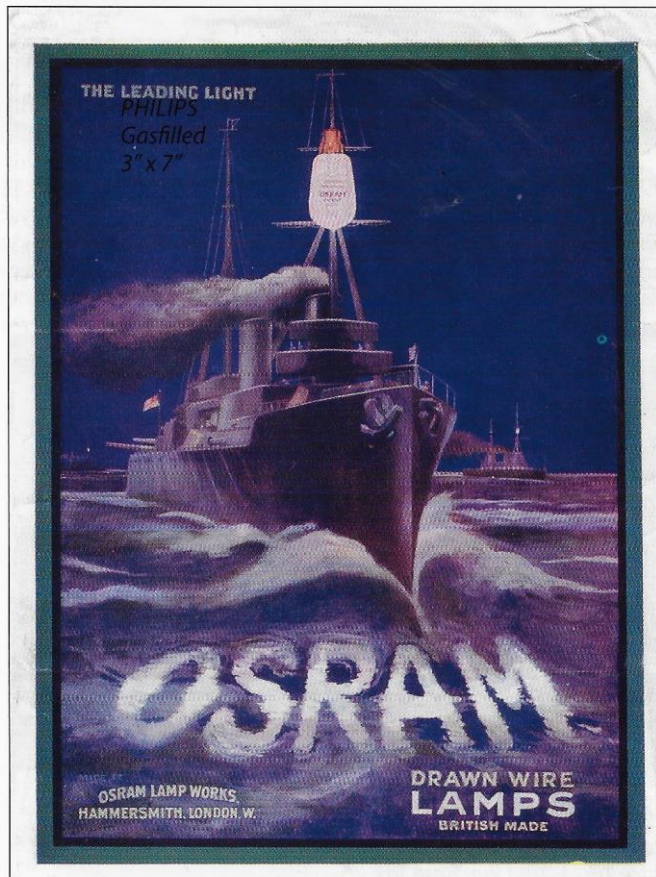
Price lists – front pages



1913 OSRAM G.E.C.



1913 OSRAM G.E.C.



1913 OSRAM G.E.C.



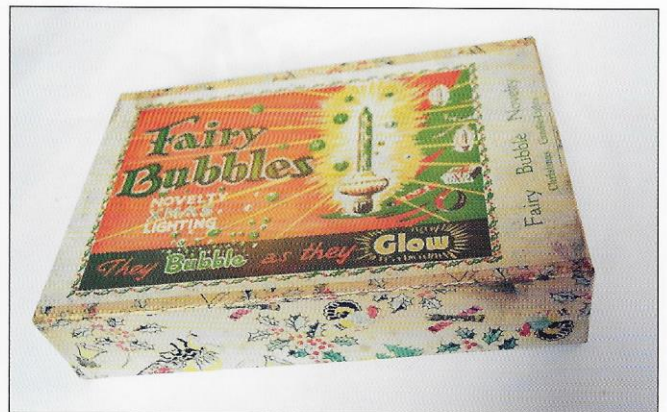
1890S ZURICH INCANDESCENCE



## Decoration Lamp Set boxes



1930s PIFCO "ELECTRIC FLORALITES NO. 1268". 'Foreign' make. Photograph of Joan Crawford, M.G.M film star. Set of 12 plain lamps set in metal flowers of several colours. Retail price 5/11d reduced to 4/11d. V.I.R. flex. 20v bulbs, series wiring. (open circuit) 240v set 10" x 7" x 2"



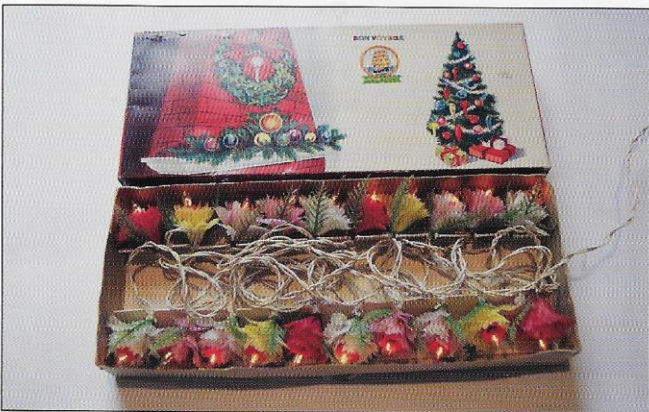
1950s McELROY ADAMS MANUFACTURING Co., U.S.A. Bubble lights. 'Foreign' make. Set of 9 glass tubes containing chemicals which bubble when heated by being seated on flat top bulbs. the plastic surrounds distort with the heat when alight. Bakelite BC adaptor. V.I.R. flex. Series wiring. (open circuit) 240v set 12" x 8" x 3"



1970s KINGSTON "FESTIVE LIGHTS", England. Large cones, painted in various colours. Incomplete set.



1930s INSIDE SILVERED LAMP SET NO. 3701'. 'Foreign' make. 16 lamps and 2 spares. Moulded in clear glass, Internal silver coating, externally hand painted. Notoriously unreliable due to internal overheating in use. V.I.R. flex. Series wiring to Bakelite BC adaptor. 16v bulbs. 240v circuit (open circuit) 14" x 6" x 2"



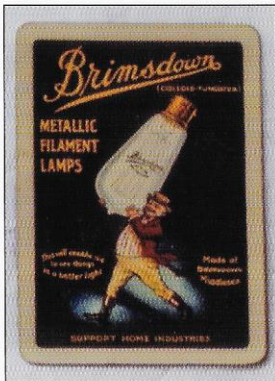
1970s BON VOYAGE. Unnamed maker. Hong Kong. Set of 20 miniature screw contact tubular lamps set in coloured plastic flowers. Modern plastic flex fitted to a pink plastic BC adaptor. 12v series lamps 240v circuit 12" x 5" x 1½"



1951 EVER READY, ENGLAND  
Battery operated set  
Price 10/- + 2/2d Purchase Tax



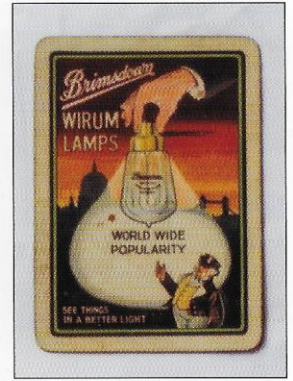
## Playing card advertisements



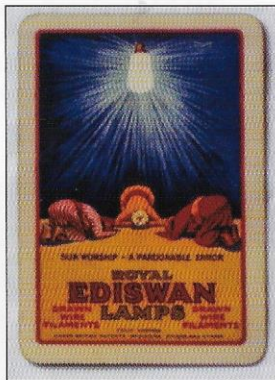
1910-1913 Brimsdown  
Colloid tungsten lamp



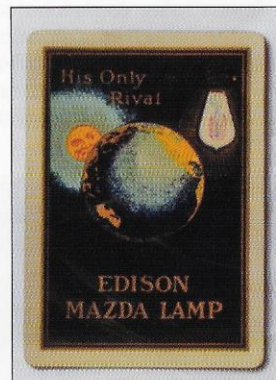
1912- 1920 Metropolitan Vickers  
'COSMOS' drawn wire lamp.



1913-1917 Brimsdown  
WIRUM drawn wire lamp



1913- 1920 ROYAL EDISWAN  
drawn wire tungsten lamp



1920 Edison General Electric  
MAZDA tungsten lamp.

## Letter Labels



1910-1923 OSRAM  
G.E.C. Drawn wire lamp



1911-1923 WOTAN  
Drawn wire lamp



1911-1923 OMEGA  
Drahtlampe



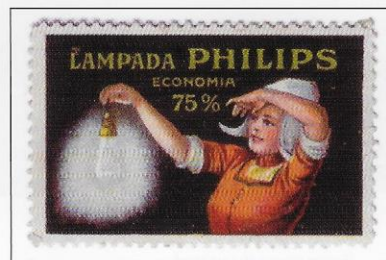
1911-1923 PHILIPS  
G.E.C. Drawn wire lamp



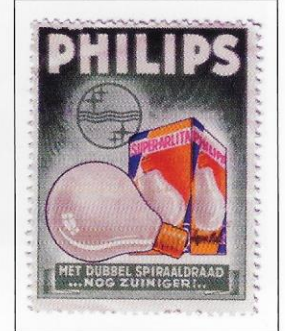
1920s OSRAM  
The favourite lamp



1925-1930 PHILIPS  
WXPOSITION, Lynn, USA



1925-1930 PHILIPS  
Holland, GLS lamp

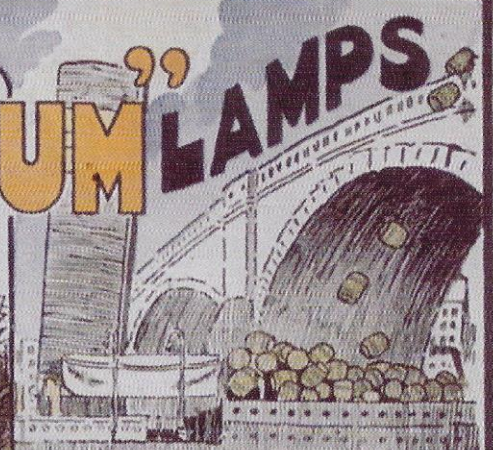


1920s PHILIPS  
Holland

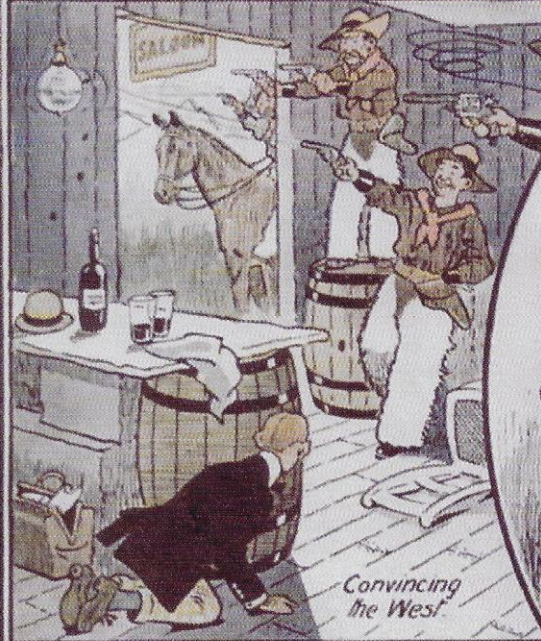


# SELLING "TANTALUM" LAMPS

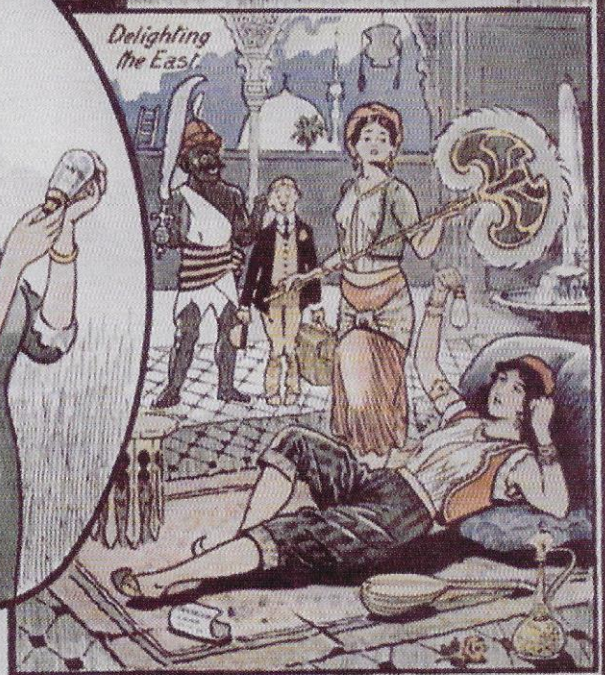
The Sales Department



Shipping Tantalums



Convincing the West



Delighting the East



Demonstrating the Strength of the Tantalum Lamp

BT MacBent

1912 SIEMENS BROTHERS DYNAMO WORKS, Dalston, London. One of many amusing advertisements to popularise the Tantalum lamp. (Page 256)