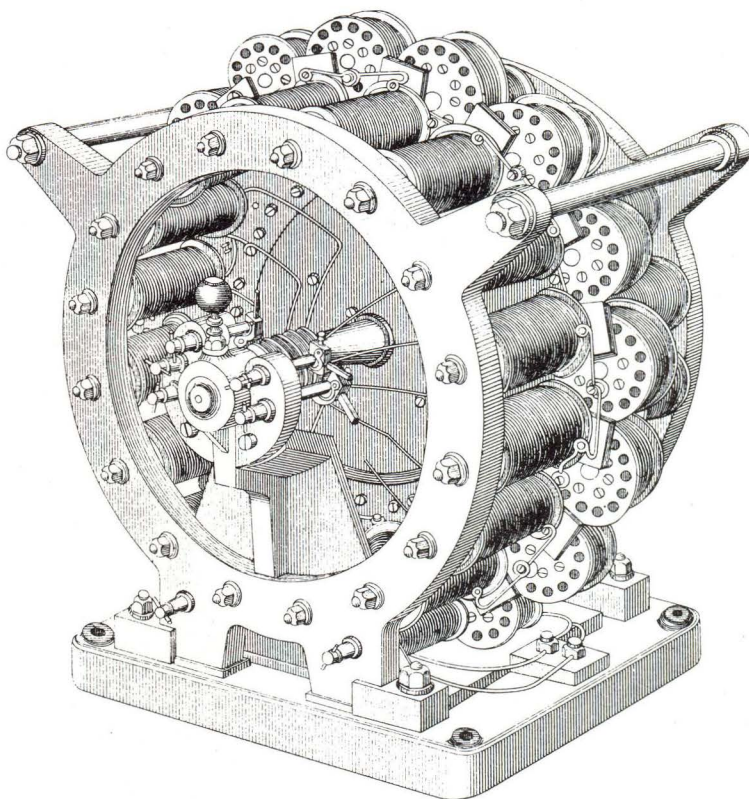


The fire and loss of 450 lives at the Ring Theatre, Vienna in 1881 was the spur for theatre managers to adopt the new, enclosed incandescent electric light to replace the open gas flames\* in rows above and at the sides of the stage. After Vienna the general public were all too aware of the fire and safety hazards present in theatres – presumably it was not generally known that in the 25 years prior to 1883 about 290 theatres had been burnt down and that 43% of these had not been opened more than 10 years. The same source as these figures estimates the fire damage accounted to £7,500,000!

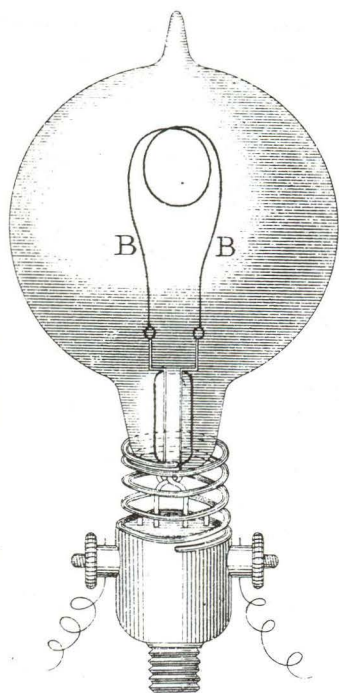
An earlier issue of *Engineering*, dated October 29th, 1880 contains a long report of Joseph W. Swan's lecture on Electric Lighting given the previous week to the Literary and Philosophical Society of Newcastle-on-Tyne. It is in this lecture that Swan put into a few words the very essence of an incandescent lamp –



*Siemens Brothers alternator type W<sup>1</sup>.*

in operation at the Literary and Philosophical Society at Newcastle in October 1877, well before Edison's patent application. Not that Swan claimed this priority as his whole attitude in both these lectures, and a subsequent one at the 1882 Crystal Palace Electrical Exhibition, was that he had succeeded where others had tried and failed. The secret of Swan's success was in the method of producing ductile carbon filaments about 3 inches long and 0.01-inch in diameter, coupled with high vacua developed by Stearn's improvements to Dr. Sprengel's mercury pump. From the first the Swan lamp

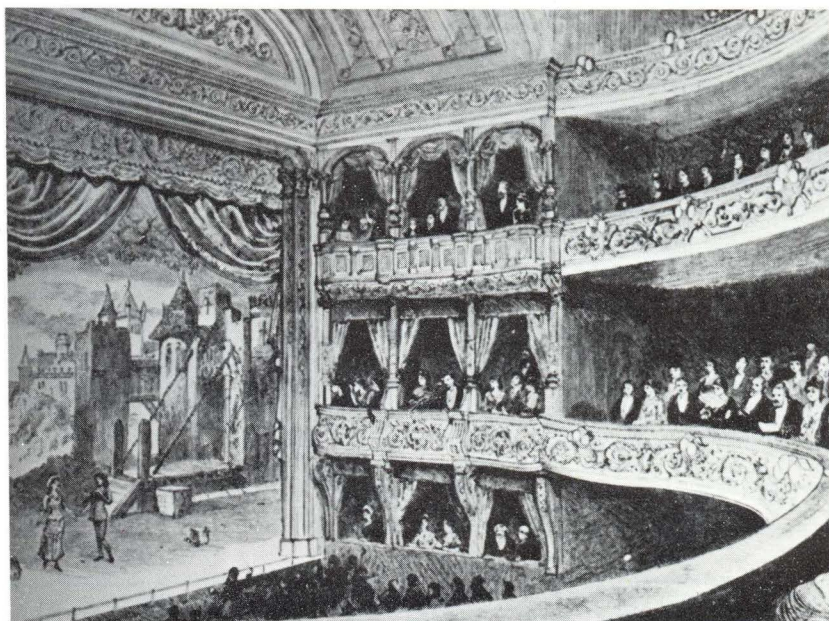
was very simple in construction being "a simple bulb pierced by two platinum wires supporting a filament of carbon". Like virtually all subsequent lamps developments the original lamp base left much to be desired being two hooks which attached to two short springs with another spring which engaged around the bulb and held the two contact springs in tension. This soon evolved into the double contact bayonet (B.22d) fitting still used today in the United Kingdom. By 1882 Swan was already virtually guaranteeing a life of 800 hours – in that respect there has been very little improvement over the years.



*Joseph Swan's carbon filament lamp and its original lampholder.*

"Electric lighting by incandescence is just as simple as arc lighting is difficult; all that is required is a material that is not a very good conductor of electricity, highly infusible, and which can be formed into a wire or lamina, and is either non-combustible in air, or, if combustible, does not undergo change in a vacuum".

The description holds good for today's incandescent lamps if "inert gas filling" is inserted as an alternative to a vacuum. In fact Swan suggested inert gas or vacuum in a lecture given to the Royal Institution on March 10th 1882, and reproduced in full in *The Electrician* dated March 18th, 1882. It is in this lecture that Swan stated that his first successful carbon filament lamp was shown



*Opening night of the Savoy Theatre 10 October 1881.*

\* The more efficient, but hotter incandescent gas mantle invented by Carl Auer, pupil of Bunsen (of burner fame), post-dates the incandescent electric lamp. The gas mantle was a development of the Drummond light, which in a basic form was the theatrical limelight.