

# THE COTTER MEDICAL HISTORY MUSEUM



Hammond Pyrometer  
Model 113



K.H. Huppert muffle furnace

## Porcelain in dentistry

Two recent restorations are of interest because both were manufactured to meet the technical requirements of an increasing use of ceramics in dentistry in the early 20th century. In the USA, despite the first patent for a porcelain tooth jacket-crown being awarded in 1889, this advance was in fact not used as a routine procedure till the early 1900's. The K.H. Huppert Type OP micro-furnace and its associated Hammond Model 113 Pyrometer (patented in 1907) together allowed a user to "bake high fusing bodies in 10-15 minutes". Porcelain clay (a mixture of  $\text{SiO}_2/\text{Al}_2\text{O}_3$ ) when fused at high temperatures produces a stable ceramic that does not deteriorate over time. However what was also recognised early on was that by varying the temperature of the furnace (sintering), the physical characteristics of the porcelain could be adjusted to suit the type of dental reconstruction being undertaken. Sintering allows both the porosity and crystal size of the porcelain veneer, inlay, jacket crown or cast to be controlled; however to achieve the appropriate temperature (between 800 – 1400 °C), a stable and precise voltage control is necessary. This explains why the Hammond Pyrometer (figured) was important, it allowed the operator to set the target temperature (in our case it was attached to the Huppert OP furnace) and routinely produce a ceramic with the desired characteristics.

Also of interest are sets of ceramic dyes held in the collections of the Cotter Museum.

These were (and still are) used to ensure ceramic implants were a close colour match to that of the existing teeth. Importantly, the 'natural' colour of the dye is altered during the firing process and as a result, manufacturers continue to produce colour charts to be used as a predictive guide with respect to the final product.