

James Rizzo

James Rizzo, who lives in Malta and is author of, among other books, *Robert Stirling's Models of the 'Air Engine'*, and also *Stirling Engine Projects*, two of several Stirling Engine publications held by Galston Parish Church. James was granted unprecedented access to measure and inspect the Stirling engines presented to the University of Edinburgh and the University of Glasgow. James and a colleague, Marie Laurie, presented the church with a specially prepared scroll of the full text and drawings of the 1816 patent application created by artist Simon Laurie. James and Marie also presented a powered model of the 1816 Robert Stirling concept, 28x18cm in size. James and Marie are pictured right with the model created and presented by the author.

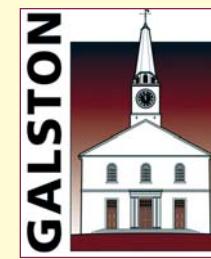


Galston Parish Church of Scotland (Charity No. SC010370)
Information Leaflet - *Our Heritage* - THE STIRLING ENGINE
www.kirknews.org.uk - email: kirknews@btinternet.com



Left: Some of the Stirling memorabilia kept by Galston Parish Church is on permanent display in the balcony vestibule.

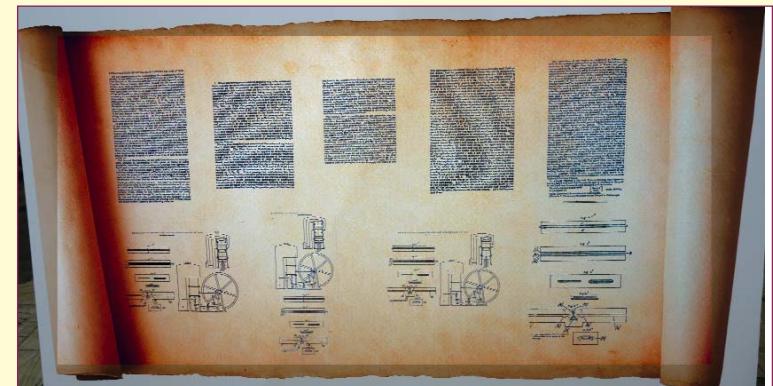
Right: A half-scale model of a Stirling engine presented by Willie Kidd.



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Stirling Engine

Galston's NASA connection



The Stirling Engine

More than 200 years have passed since that Patent of 1816 and there are many who may ask: What is a Stirling Engine and how does it work?

As an external combustion engine, it is similar to a steam engine and in fact it competed with steam engines for many years, however, the type of fuel used is

not critical as it can run on anything which produces heat. When a confined body of gas - air or helium or whatever - is heated, the pressure of that gas rises; that increased pressure can push on a piston to drive a flywheel, following which the body of gas - if cooled - will incur a drop in pressure which will allow the piston to return to its starting position. That same cycle can be repeated over and over, using the same body of gas. That is all there is to it, no ignition - no carburation - no valve train - no explosions! Consequently, a great many people have difficulty in understanding that basic Stirling Engine - it is so much simpler than conventional internal combustion engines.

Robert Stirling's radical engine unit which has a high thermal efficiency and a large number of inherent advantages, such as flexibility in the choice of fuel - including sunshine - has been subject to on-going research and development throughout those years during which variations have been used to drive water pumps, sewing machines and turntables prior to development of the electric motor.

Also, Stirling and Steam grew up together early in the Industrial Revolution and, indeed, Rev. Dr. Stirling developed his engine partly in response to the human suffering from steam boiler explosions; workers of that time were cheap and liability was nil. Cast iron was the material of the day and in incorporating such

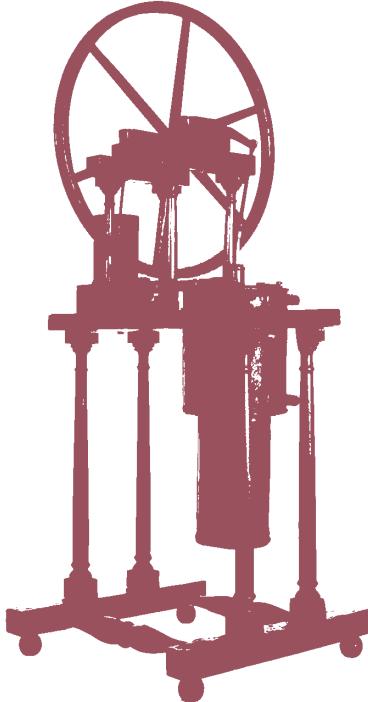
metalwork, Stirling Engines did not fare so well as steam engines; the fuel efficiency of the Stirling engine was also unimportant when coal was virtually pence per ton and so, steam engines prevailed.

However - today - with the advance of materials and technology - there are variations of Stirling engines which already touch our daily lives. As an engine which is bi-directional, that is if temperature difference is applied, rotation is produced and so it makes a refrigeration unit; liquefied gases such as liquefied oxygen or nitrogen have been produced using Stirling type engines. Another example is found in satellite weather pictures, produced by courtesy of a tiny Stirling type cryo-cooler which is used in the satellite to cool an image sensor to near absolute zero.

So, today, from a basic model hand built by a Stirling Engine enthusiast using the heat from a cup of hot water to drive that piston to turn that flywheel, and, through many and various innovative developments - including use of a variation of the concept of the Stirling Engine in space exploration techniques employed by NASA - we may marvel at the innovative technical and engineering skill of the Rev. Dr. Stirling some 200 years ago!

Today, in recognising that well respected Minister of the Church of Scotland and his extraordinary skills:

- ◆ we may find on the internet, a web-site in which the University of Glasgow provides pictures of eight famous Glasgow Scholars including James Watt, John Logie Baird, William Thomson (Lord Kelvin) and - yes - the Rev. Robert Stirling.
- ◆ in October 2014, the name of Robert Stirling was inducted into the Scottish Engineering Hall of Fame, based in Glasgow.
- ◆ in December 2015, the Institution of Mechanical Engineers - with their headquarters in London - honoured Robert Stirling by presenting an Award to the model Stirling Engine made and gifted by him to the University of Glasgow in 1827. That model - and award - can be viewed today within the gallery area of the Hunterian Museum at Glasgow University.



The Rev. Robert Stirling was granted a patent for his innovative engine in 1816. This model was presented in 1827 to the University of Glasgow by Rev. Stirling and used by William Thomson, later, Lord Kelvin, in his pioneering teaching and research into the fundamentals of thermodynamics. An Engineering Heritage Award, presented by the Institution of Mechanical Engineers, is displayed with the engine in the Hunterian Museum.



Some of the items, including a model of a Stirling Radioisotope Generator, used in space exploration and presented to Galston Parish Church by NASA engineer, Bob Cataldo.