

Historical background: The solar cooker according to Augustin Mouchot

In mid-nineteenth century, industrialization progressed at high speed. One of the side effects was the necessity to have fuel for the steam engines that were the central power source in the factories. To France, this started to pose a major problem, as the coal deposits turned out to be limited and were almost exhausted. This was even more a problem as the potential imports could only come from England—the traditional (economic) rival to France. Consequently, the French government promised financial support to any researcher who proposed promising concepts of how to avoid a dependency of France from English coal.

This was the moment when the French secondary school teacher Augustin Mouchot entered the stage. Mouchot combined two devices that had been known previously: A blackened hollow cylinder containing water—a similar device had been used by the end of the eighteenth century by Horace Benedict de Saussure for making experiments on heat radiation. This was combined with a hollow mirror that was used to focus solar radiation on the cylinder. Already in 1861, Mouchot was able to produce steam with his device. In the following years, he intended to improve his set-up to make it more useful for technical purposes. The attempts were financially supported by the French government.

Two outcomes can be named as direct results: On the one hand, Mouchot was able to develop solar cooking devices—items that were used in particular by the French army in their North African colonies. These devices enabled the soldiers to prepare hot meals without producing smoke, a detail relevant from a military perspective. These cookers were used until the 20th century.

The other result of Mouchot's attempts was a steam engine that was operated with steam produced by his solar apparatus. Mouchot devised several of the engines; the largest was shown at the world exhibition in Paris in 1878. The conical mirror had a diameter of some five meters, and the engine could be used as a printing device and was also able to produce ice.

Mouchot was awarded a gold medal for this machine. Yet, by this time, things had changed once again. A major problem of Mouchot's machine remained the mirror which was made with a silver coating—this tended to oxidize, thus reducing the efficiency of the machine and requiring a constant cleaning of the mirror. However, another

development turned out to be far more problematic for Mouchot: Miners had found new coal deposits in Eastern France; consequently, the necessity for finding an alternative source of energy for the steam engine did not exist any longer. Moreover, in a report, Mouchot's machine was labeled as economically inefficient. As a result, the French government ceased to support Mouchot's research financially. This brought his work to an end.

References

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Historical Background: The solar cooker according to Augustin Mouchot was written by Peter Heering with the support of the European Commission (project 518094-LLP-1-2011-1-GR-COMENIUS-CMP) and the University of Flensburg, Germany. This publication reflects only the views of the author, and the Commission cannot be held responsible for any use which may be made of the information contained therein.