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Kerosene and steam heated stove³³

STUDENT AWARD THIRD

Vyasji Mishra (16) is an extremely talented student with a penchant for science. Vyasji lives with his parents, his elder brother and a sister in Devsar, Madhya Pradesh. Presently he is studying in 11th Standard. His father has done his B.A. and works as a clerk in the Devsar Tehsil Office. His elder brother Pawanji Mishra is a first year BCA student. The household income of his family is Rs.60000 per annum and comes solely from the income of his father.

Vyasji developed a keen interest towards science and its various applications from his very early childhood and has also developed a number of products having a strong scientific basis. He also actively participates in various science competitions. Vyasji admits the exigencies of reality: "I am a student, and my father is a clerk. Since our financial condition is weak I don't have most of the required equipment with me." Still he doesn't give up hope, "But I have a great wish to become a scientist."

Genesis Vyasji's elder brother Pawanji Mishra had developed a model of a similar kind of stove for a science fair in 2001-2002, which was not successful. In 2002-2003, there was a science exhibition held in his school, Utkrishta Vidyalaya, Sidhi in which there was a section called 'Sources of Energy' and Vyasji wanted to take part. Both the brothers together created the stove by joining two kerosene stoves together and using three regulators - one for the kerosene, one for the water and a third for switching the burner on and off. While developing this stove, the major problem he faced was the control of kerosene and water flow, but he was able to rectify this to some extent by using three regulators. This device took approximately six months to conceive and manufacture.

Vyasji's family gave him moral support throughout the course of development of the innovation. He acknowledges that it is because of the constant encouragement

and financial as well as technical support provided by his elder brother, Pawanji, that he was ultimately able to successfully complete the innovation.

The Innovation

This is a hybrid stove powered by kerosene and steam. The stove has been prepared by joining two conventional ones and has two tanks, one burner and three regulators. The two tanks are filled with kerosene and water respectively. Both the tanks are connected to the common burner. A pump is provided with each tank for creating air pressure therein. Pipes are secured to the burner for conveying kerosene and water to the burner assembly.

The stove is started with kerosene as usual. After some time kerosene valve is partially closed (i.e. 80% open). The water valve is slowly opened and kept open between 0-20 per cent. Now, both the kerosene valve and water valve are

partially opened and the mixture of kerosene and water is admitted to the burner in the maximum ratio of 80:20. Mixture of hydrocarbon and water as fuel has been very well known in the art and maximum permissible mixture ratio for the optimum one will be 80 to 20.

It would cost around Rs. 600 in the market. But one has to observe the following precautions: when the water regulator is opened, the kerosene regulator must be shut. When filling the tanks special care should be taken to see that there is no dirt.

Advantages

Less smoke is produced and it is therefore friendlier to the environment. This innovation is of great benefit to especially the poor who are the major consumers of kerosene. It also gains significance in the light of the increasing fuel prices. There is also potential for future applications of this concept in glass and toy factories, laboratories and small-scale establishments.

Current status

Vyasji has displayed this stove in various science exhibitions. It also got coverage in the newspapers in February 2002. He was awarded the first prize for this innovation by the education Minister - Indrajit Kumar Patel at a Science exhibition held in 2003. Apart from this stove Vyasji has also developed a model of a drip irrigation system, which got the first

prize in a science exhibition in 2000. With the attitude of a researcher, Vyasji is able to appreciate that his stove needs to be improved. He points out that as it uses water, after some time the burner becomes cold and stops and he talks of the need to think of some way in which it will work continuously on water without stopping unless switched off. However, much more research remains to be done. The Indian Institute of Petroleum, Dehradun had reservations about this concept but IIT Guwahati tried to optimize the working of the stove and found that it could save about 20 per cent kerosene with proper calibration. NIF in coordination with the GIANS has sanctioned an amount of Rs. 37, 250 from its Micro Venture Innovation Fund for prototype development for market research of the water-kerosene stove and three other innovations.

Earlier, a similar stove developed by Rajiv Agarwal had been awarded by NIF. The key design difference of Vyasji's stove with that of Agarwal's steam operated stove is the following:

In case of Agarwal's stove, the steam is injected to hot burner. Mixing of steam and kerosene takes place at the point of flame. Whereas in the case of the modified operation of Vyasji's stove the mixture of kerosene and water is injected into the burner. Mixing of kerosene and water takes place before the burner (at the entry of the burner) and the mixed hydrocarbons are responsible for the continued burning and fuel saving.