Pump-less stove with kerosene heating

CONSOLATION

Sarfuddin Kazi (45), of Dharangaon in Jalgaon, Maharashtra is a machinist and owns a welding workshop where he manufactures all the components of the stove. His formal education ended with failure in the sixth standard and he admits that he is barely literate. He has three brothers who are also employed in the workshop. None of them has undergone any formal training.

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Genesis Sarfuddin had seen the ordinary stove in operation and noted its drawbacks. It was noisy, unsafe, and required a fair amount of maintenance. Since, the consumption of kerosene was also high, it became an expensive proposition, especially in the context of rising fuel prices. The other alternative, LPG, was also unaffordable to most. Sarfuddin felt that the poor needed an efficient device to meet their domestic requirements. He knew that such a device would have to combine the features of maximum heat generation with minimum fuel consumption.

A keen observer, he analyzed the working of the petromax used in his village. He discussed the working of the petromax with fellow villagers and technicians. He learnt that in the petromax, the fuel is converted into gas and the gas burns without emitting any smoke. He realised that if this principle could be applied to a kerosene stove, a lot of fuel could be saved and pollution could be avoided.
He came up with the idea in 1990 and it took another two and a half years for him to build the first prototype. All the components of this stove such as the burner, the fixed fuel tank, the gas wigs and the frame of the stove were fabricated by Sarfuddin with his small lathe machine in his workshop. Casting was done with the help of a mould and a small burner pit in his workshop. Special actions were performed with the help of a small drill machine and a welding machine. The process of fabrication, was however, fraught with problems. To arrive at the correct diameter of the nozzle as well as the number of holes in the burner, he had to try various combinations. He had to also deal with problems such as leaks in the fuel pipes, a poor flame and a silencer that would not work. After continuous trial and error, he was able to overcome these problems.

One of the features of this stove is the copper coated steel transmission pipe, which does not burst because of heat, pressure etc. Sarfuddin had seen such a pipe being used in the diesel trucks that his father drove, and felt that it would suit his innovation well. While using this stove, one day, he noticed that a spark which fell from his cigarette on to the stove glowed brightly. He then realized that the stove could be used to provide light as well. Sarfuddin acknowledges the help given by his brothers in developing this innovation.

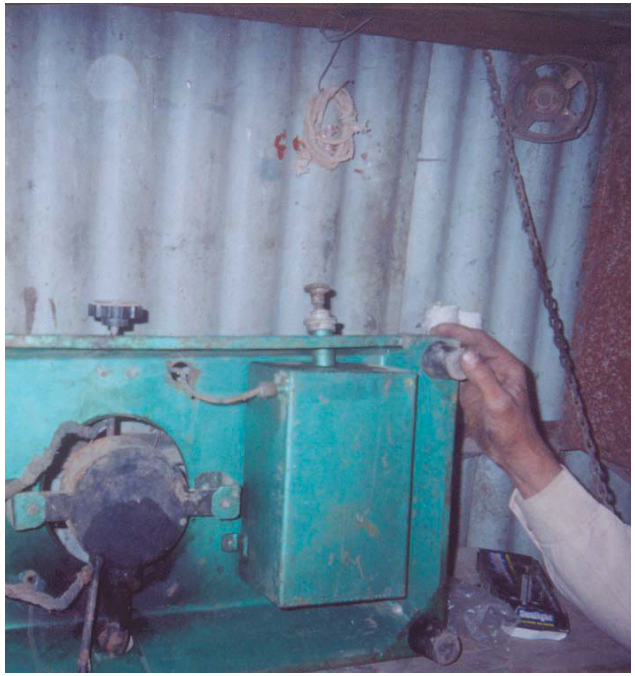
The Innovation

This stove comprises a tank for the kerosene, a burner and a facility for providing light. The tank is connected to the burner of the stove through a copper coated steel transmission pipe which is passed over the burner. A pump is attached to the tank for creating air pressure in the tank. Initially, the stove has to be pumped to produce the appropriate pressure for the fuel from the tank to be transferred to the transmission pipe. At the same time, the fuel transmission pipe is pre-heated with an external source, till it is hot enough to convert the forced fuel into gas. Once the fuel is converted into gas, the external heating is taken away and the kerosene in gaseous form is ignited. The system uses the gas generated for cooking and providing light. The burner now plays a dual role – the primary use is for cooking and the secondary one is for heating of the transmission pipe to generate the gas to run the unit. This gas is also used to provide the light.

With two litres of kerosene the stove can burn continuously for eight hours. If the stove is not used to provide light, it can be used for upto nine hours. The cost of the stove is around Rs.1000.

Advantages

This stove burns with a blue flame and thus does not blacken vessels. It is safer than conventional stoves as after initial pumping to light the stove, stable pressure is maintained in this stove which is different from conventional pumping stoves in which the pressure keeps on changing. In addition this stove is noiseless and does not require cleaning as often as the conventional stove. As the stove needs to be pumped only while starting, less effort is required. While ordinary stoves use brass burners that need a lot of maintenance, this stove uses a burner made by Beed casting. This burner ensures lower fuel consumption as it does not cool as quickly as the brass burners. At 500g, the burner is also heavier than an ordinary burner and this further contributes to conserving heat. The smokeless fumes emitted by this stove reduce the hazards and diseases caused due to smoke inhalation. This stove is also ideal for road-side food vendors and dhabas. Moreover, this stove can be used by canteens in urban areas that require stoves with high performance capabilities and are cheaper than LPG. It can also be used in laboratories where a continuous flame is required for a long time.Though this stove is more expensive than the two types of stoves (pump stoves- Rs.250-300 and



wick stoves-Rs500-550) available in the market, its many superior attributes make it worth the price.

Current Status

With his desire for perfection, Sarfuddin is constantly working on improvements in the design. Currently he is looking at reducing the area of the stove, by placing the tank below the burner instead of beside it as is the case now. This will also reduce the amount of metal used. He has made three stoves till now. He used one model for about 8-10 months to see whether it was working properly. Sarfuddin has plans to start a commercially viable business with his innovation if he can get the necessary financial support. 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 for the kerosene gas stove and three other innovations.This innovation was featured in the Lokmat and Deshdoot newspapers. Sarfuddin's skill with machines is well known in his village and the local Industrial Training Institute (ITI) and the villagers are now planning to honour him.

The desire to invent

Sarfuddin has been interested in machines since childhood, especially as his father was involved in repairing primus stoves after he retired as a State Transport bus driver. Sarfuddin learnt some of the basic concepts of working with machines from a friend who was a blacksmith. He preferred watching the blacksmith in his workshop to going to school. Later he tried to replicate his observations at home. When he was 17, he made a machine to make cotton candy just by observing the operation of the machine. At the request of an oil mill owner; he made a steam boiler for Rs.22, 000. The market price of the device was a lakh of rupees. He has also done welding of towers using an electric generator. He is currently working on the idea of a generator which would not require diesel, petrol or kerosene but would be able to convert mechanical energy into electrical energy. He got the idea of such a generator when repairing their diesel generator. Sarfuddin is also skilled in carpentry and in working on gold and silver. Though he has no formal training, Sarfuddin often goes to the ITI in his area to give practical inputs on the functioning of various machines to students.

One of his brothers, Fakhruddin Amanuddin, also shares his innovative spirit. Fakhruddin made a metal cutter in a week as it was required for making school benches. He developed it at a cost of Rs.6000 whereas the market price of a similar cutter is Rs.12, 000.

Social initiatives

The village Dharangaon is known for its communal harmony. Hindus and Muslims live side by side and Sarvadharm Samabhav is the ruling principle of the village and this spirit is also reflected in Sarfuddin's social initiatives.Sarfuddin made a 40 inch tall lamp weighing 40 kg for the local Chintamani Moraya Temple, free of cost. Many devotees donate bells of various types to the temple. At the request of the trustees he made a lamp using the metal from these bells and other offerings. He also donated a decorative piece used in processions to the Masjid, sixteen years ago. The piece, made out of metal (compared to the earlier bamboo one) continues to be used in the procession. When the local school needed 130 benches, he made them himself and gave it to the school at a concessional rate. Popularly known by the name of Jumman in his village, Sarfuddin is known for helping those in need. He accomplishes all these social ventures inspite of his strained financial circumstances. When asked about his dream Sarfuddin has an interesting answer- *"Don't dream, just keep on doing what you have to - then things will happen."*