

Hand pump with modified plunger

State Award
Bihar



Ramashankar Sharma
Siwan, Bihar

*Jivan kathin hai aur samay-samay par hamari pariksha leta rahta hai
lekin is imtihaan me khara utarane ke liye hame apane vichar, aadat,
soch sabhi me badlao lana jaruri hai*

We have to face a lot of difficulties in our lives, to succeed we need to modify our thoughts and habits according to the changing times.

Women plodding wearily on the hand pump are a common site especially in rural areas. Not much improvement in the design of the pump has been done, which can reduce the effort in pumping water. Ramashankar Sharma (57) has modified the plunger of the existing hand pump improving its efficiency and hence, reducing the drudgery.

Ramashankar Sharma was born in 1952 in Hathoj, Siwan in a farmer's family. His family is steeped in blacksmithy and allied crafts. His mother expired when he was only three and in 1958, his paternal aunt took him to Burnpur in West Bengal where his uncle worked in a Steel Factory. There he grew up with his cousins and completed his education till matriculation.



His uncle was an expert in casting, forging and fabrication of iron components and had gained considerable experience working with leading engineering firms during the British period. In his formative years, Ramashankar worked with his uncle and developed the skills of metallurgy.

In 1966, he returned to Bindusar where he got married to Kailashi Devi in 1973. Seeking better opportunities, he traveled to Kolkata, and earned a living working at workshops and working part time as a driver. After spending four years, mainly in automobile work, he returned to Siwan in 1977 to start a machinery shop of his own.

He opened a factory for casting iron and manufactured hand pumps under the brand of "Kiran Chapakal" but suffered huge losses and had to close down very soon. Then he started a rice mill and worked hard for eight years. In 1985, he applied for a loan for seven and a half lakh rupees from Finance Corporation but received only three and a half lakh with which he started a workshop on the main road in Rasoolpur, his neighbouring village.

His village Bindusar Hamid is a small village, located five kilometers from the Siwan city. He owns one acre of irrigated land where he grows paddy, wheat, gram, maize etc. In a rented premise he runs his workshop RG enterprises, where the repairing work of threshers and house grills is done. His second workshop, 'Maa Kali Engineering Works' is located in Siwan city where four workers take care of fabrication and repair work. He has four sons and one daughter. His wife died in 2007. Daughter, who is the eldest, is married and settled in a neighboring village. His eldest son helps him in the workshop while the younger three are studying.

Journey of innovations

His journey of innovation started in the early 1980s without any conscious plan. His wife's maternal uncle, who had been working for 10 years to make a bullock operated pump, died suddenly leaving the work unfinished. Ramashankar brought the prototype home and started working on it to rectify

various components to reduce the vibration and noise problems. He redesigned the lever system and installed a gear system.

It took him three months and expenditure of around Rs 10, 000 to do the modifications and get the model working. He exhibited the bullock operated pump at the famous *Sonpur mela* in Saran district, Bihar in 1994 where he was given the first prize by the then State Agriculture Minister.

His other works include redesigning the rotary furnace, remodeling a 25KVA generator and tagging it to a 10HP engine to run machines like lathe, grinder, welding machine in his work shop. He is able to run three welding machines simultaneously using this arrangement. This interesting work earned him a mention in the Economic Times, Patna edition also. In 2006, he focused on developing a battery operated bicycle for his convenience, which he demonstrated before the District Magistrate and got accolades. Using the car battery from a Maruti, he spent over Rs 10,000 in developing this electric bike, which could run at an average speed of 20 kilometers per hour. Since the mid 1990s onwards, his innovations started getting wide coverage regionally in newspapers such as Dainik Jagaran and Akshar Bharat and television channels such as ETV Bihar.

Modifying the hand pump

Ramashankar noticed the problems associated with the existing hand pumps. He observed that the cast iron body and components was prone to rusting and enhanced wear and tear due to repeated use. This affected the service life of the pump and also contaminated the water. Further, he noticed that the efficiency of the hand pump was less compared to the effort. He analyzed the problem and came to the conclusion that this was due to the pressure losses in the plunger and creation of the gap that lead to pressure dissipation.

He had earlier tried to modify the hand pump with a little success. In the year 1988, he started working on an improved hand pump design, with a guided plunger capable of higher water discharge. Then again in 1990,

considering the disadvantages and added weight of cast iron hand pumps, he had designed a pressure hand pump made of mild steel to pump water up to the height of thirty feet. He also developed another hybrid pump, which could pump water in both forward and reverse strokes.

Given his earlier experiences, he decided to redesign the hand pump using stronger but lighter mild steel components and incorporate a new plunger design, with reduced pressure losses and increasing the discharge and pumping efficiency. He started his work on this innovation in 1997 and developed the first prototype in 2000. He spent around Rs 10000 in developing this pump. The hand pump served the dual purpose of acting as a normal hand pump as well as a pressure pump.

Innovation

The innovation is a redesigned pressure hand pump, made of mild steel and fitted with a modified plunger system. The optimized plunger delivers higher efficiency by minimizing the pressure leakage compared to the conventional hand pumps.

The modified plunger has a guide rod in the center to reinforce the unit, provide smooth action and prevent the seals from bucking. The plunger has been made without the wavy grooves as in existing units, which eliminates the chances of slippage. The hand pump has a bore of 87 mm and a stroke of 127mm. With the unique and guided plunger design, it



delivers 69 per cent more discharge with the same effort compared to plungers in conventional unit as per the tests facilitated by NIF and conducted at BIT Mesra, Ranchi.

Unlike four bolts used for fixing in conventional units, only one bolt is needed to tighten the valve in this design. Being equipped with an improved hand lever for the user, the unit also facilitates water transfer from 2.5 inch pipe to 2.5 inch pipe while conventional units allow the transfer to 0.5 inch pipe only.


This unit works as a pressure pump and uses a modified plunger that can deliver water upto a height of 30 feet. The use of mild steel makes it lighter yet more durable, when compared to the conventional cast iron based units. It weighs only 8 kg whereas the conventional ones weigh 25 kg. Also, at Rs 500, it costs half than the conventional models while delivering superior performance.

Similar concept of hand pump is not available in art. All the commercially available hand pumps are generally made of cast iron and weigh around 25 kg. Prior art discloses hand operated and power operated piston pumps with or without pressure chamber. NIF database has a record of *Balekuli* hand pump of VK Hegde of Karnataka where the pressure chamber is coupled with the piston pump to maintain uniform water delivery rate over long distances with less effort. For the pump, NIF has filed a patent in his name.

Applications

Millions of users across India are dependent on hand pumps. They use units that are often archaic, laborious to use and less efficient. This sturdy durable unit, delivering higher discharge, can be installed for public waterworks utilities.

As compared to the pumps available in the market, costing over Rs. 1000, this unit costs less than Rs 500 with a savings potential of 50 per cent. He also sells the plunger separately for Rs 25.



He has manufactured and sold more than five hundred hand pumps to customers in Siwan, Patna, Chapra, Hajipur, and neighbouring areas and some even in Mumbai and Kolkata. He has also had to face the problem of local manufacturers copying his designs. He tried to tie up with a firm in Delhi for the production of hand pumps and worked with them for three-four years but got a raw deal in the end. After this, he has concentrated his sale to the Siwan region.

Looking ahead

Though he has managed to earn a decent living but his love for innovations has dented a hole in the family savings. Within the family everybody admires him for the tremendous amount of hard work he puts everyday and has supported him all the way. However, they suggest him to be more careful while spending as he has to support a family and look after the children, whose needs have also increased with time.

Ramashankar feels that the lack of proper funding is a major deterrent in work of people like him who want to do something new and different. His desire is to take forward his innovation of the hand pump as he believes that this can capture good market but is waiting for the funds. Among other things he wishes to develop are a tractor without gear and differential, and improve the efficiency of the bullock driven pump so that it can be used in a variety of other tasks.