Pedal operated pump[79]

CONSOLATION

Nasiruddin Gayen (40) hails from Mograhat village, South 24 Parganas, West Bengal. He is married and has three children. Ever since he was a teenager, Nasiruddin always displayed a curious streak. He did not like to study, but preferred romping around the fields, with questions buzzing around his head: "Why doesn't the sun stop shining- How and why the earth rotates –who made this nice system of earth, moon etc" - a number of these questions considered heresy by his religion. His innovative nature found an outlet in the pedal-operated pump[1] which he has developed.

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Genesis Nasiruddin noted the numerous difficulties faced by local farmers in arranging irrigation. Diesel pumps came at high rents; man power was scarce and expensive for carrying water from the local, natural sources for irrigation. He also noted the difficulty faced by women, the elderly, children and the physically challenged in using the ubiquitous hand-pumps for extracting ground water. Pumping was strenuous particularly for the weak, ailing and those with heart problems especially as it had to be done standing / in bent position. In addition delivery was not continuous and water came only with each stroke.
Since in ordinary pumps only half stroke is used for suction, delivery is low for agricultural needs. Further hand pumps are stationary and water required had to be tediously carried far-off.

Observing all this Nasiruddin, a matriculate village youth of the remote South 24 Parganas village in West Bengal neglected higher studies ,his work and wandered around wondering if and how he could make some solution for this problem. Nasiruddin's father, a village school teacher, could not fund him but this did not deter Nasiruddin , who saved from the daily tiffin allowance given to him and managed to fabricate a two-barrel, continuous suction /discharge reciprocating pump model sometime in 1982-83. He displayed this model at a District Science Fair in 1983-84, where he got the first prize. After some more tinkering with his model and fantasising about its various possibilities for two-three years, he again got a chance to display it at the Salt Lake Science Fair in 1985, where also it got a prize. However in these three years he could get no support to commercialize his invention or receive any personal sustenance for further work.

The Innovation
The present invention relates to a pedal water pump which is particularly useful for pumping water from the canal for irrigation purposes and to draw water from wells, tube wells and reservoirs.

It comprises two cylinders each having a piston and an inlet and outlet connected to a common source and outlet respectively. The unit has five valves, one located at suction at the bottom, two at the entry of the twin cylinders and two at the delivery pipes located at the top. Other components include shafts, bearings,

connecting rods and plummer blocks to transmit power from rotary to linear motion and give constant water output. The entire arrangement is supported with a steel channel frame legs and can be transported to site and the suction pipe can be connected to a water source or put in the canal.

The user sits on the seat and pedals the unit, thereby operating the flywheel, which runs the gear which drives two sets of pistons located in two vertical cylinders. The rotary motion of the pedal is translated into alternate vertical up and down movement of the pistons in their respective cylinders. While the piston in one cylinder goes up, the piston in the second cylinder goes down and this ensures constant discharge of water and no dead stroke for the pumping operation.

Advantages

The unit delivers 100 liters of continuous flow per minute compared to 70-80 liters per minute of intermittent flow for a normal reciprocating hand pump. This novel pump is portable and can be taken and installed on site at will. The pump is very cost effective as it costs about Rs.31 per litre per minute. It costs Rs. 2500 for a complete cast iron unit and Rs.3000 for a unit combining aluminium alloy and cast iron components. The novel twin cylinder system with connecting rod/gear/flywheel arrangement ensures constant delivery of water without any dead stroke. There is constant steady output with lesser biomechanical load while using for longer time. This is easier to pedal than pumping by hand especially for people with heart ailments, elderly, women and children.

From pillar to post

But determined to attain his goal, Nasiruddin sold some of his ancestral land and managed to make one small workshop, where he fabricated the working prototype of his model. He decided to pursue a career in marketing this product. He also got his idea registered for patent protection and later put together some money to arrange filing of patent through an attorney in 1986. He then went through a series of troubles-lack of support, familial opposition, labelling as a maverick, non-earner and study –shirker (he had not yet pursued higher secondary in the struggle to transform his innovation to success). Another two years passed away before he got patent registration in 1988. But still no entrepreneurial support had come and due to personal financial limitations, Nasiruddin was also not able to market the same himself.

Finally he approached the Department of Science and Technology, West Bengal in 1988-89 which sanctioned approximately over one lakh rupees to the Saha Institute of Nuclear Physics for development of the project. Thus after 6-8 years of intense struggle, Nasiruddin received government support- he was appointed to a purely temporary post of project technician of the project entitled 'Pedal operated pump' sponsored by Science and technology dept, Govt of West Bengal, on a monthly salary of Rs. 800. But since the professor in charge of the project failed to deliver the final working, marketable prototype, the project was discontinued around 1991-92.

A new chapter of further struggles

By this time Nasiruddin, under family pressure for employment, struggled to clear his Higher Secondary (1989) and BSc (1993) both through part time classes and evening college. From1993 he kept on trying to realise his dreams but in vain.

Collaboration with institutes

Ultimately after another ten years, in 2002, i.e. approximately 20 years after conceiving the innovation, Department of Science and Technology, West Bengal once again made a grant of Rs. 1.5 lakhs under Dr. Amit Roy Chaudhary, Dept. of Applied Mechanics and Dwg., Bengal Engineering College (Deemed University), Howrah where the prototype is now under further development. Nasiruddin Gayen has been given a purely temporary project post with a salary of Rs.2500 per month.

The Secretary DST, (West Bengal) had asked Dr. Choudhary to make a project proposal keeping in mind

the fact that this pump should be made a marketable product. After getting this project, according to Dr.Choudhary his first observation was that the kinematics and mechanism of this pump is very simple and superb. He felt that he had nothing to add in this aspect. He has made some small changes to improve this pump keeping its marketability in mind. The main objectives of these changes were weight reduction, greater flexibility and making the product more aesthetically presentable. Weight reduction was done by changing the cylinder wall thickness and by replacing cast iron by plastic. To get different types of output, it was suggested to make a slot instead of a hole at the crank head in crank connecting rod mechanism. Better surface finish was given by advance quality machining. Dr.Choudhary reiterates that all these changes were made under his supervision with the strong and active participation of Mr. Gayen.

Considerable social impact

This innovation has great social significance as it delivers water faster and saves time, effort and can be used on any site. This product will be especially useful for the small farmers for serving the purpose of irrigation on a small scale. It also offers flexibility of use as it can be driven manually or by motor. Currently the innovator's prototype is in use and DST sponsored development work is underway for further development.

The pedal-operated pump innovated by Nasiruddin Gayen is undergoing development work under the guidance of Dr Amit Roy Choudhary, Bengal Engineering College, sponsored by the Department of Science and Technology. Nasiruddin Gayen has developed a unique hand pump that, unlike conventional hand pumps, not only delivers water continuously but also requires lesser biomechanical effort for operation due to the use of bicycle pedaling arrangement.