A farm implement without a steering wheel and others

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Doing away with the steering wheel, Bachubhai (58), an inventor and innovator, has developed a lever operated farm machine capable of doing most agricultural operations. He also has many more innovations to his credit *viz.* motorcycle operated agricultural device, sensor system for irrigating fields, a personalized bulb with an added circuit to increase life, multi-purpose machine consisting of a generator, a water lifting pump, a flour mill and an iron cutting machine, among other things.

"Necessity is the mother of all inventions", an oft repeated quote, holds true for many but in case of this ingenious innovator, it becomes an understatement. Inventing, for him, is the necessity to keep himself going and has become a way of life. He lives in village Kalavad, 30 km away from Jamnagar. The eldest among three siblings, Bachubhai neither had the aptitude nor the interest to take up agriculture, his family's traditional occupation. As a child, Bachubhai had great interest in electronics and other mechanical works. He recalls of having made a radio set in his school days, which is still kept in his school as a relic. Whenever he accompanied

his father to the fields, he would make different things resembling devices and instruments with the wet soil of the field. There must be something wrong with him, Dahiben, his mother, thought once, as he wept and cried almost continuously for nearly a month after his birth. Something wrong indeed and in what a prolific way!

After studying till class tenth, Bachubhai went on to do a six month course in radio repairing and opened a repairing shop, Jyoti Radio Service in 1984 and ran it for over fifteen years. With the advent of televisions, slowly, his earnings dipped, prompting him to do another course in television repairing. He then opened a shop, Bhagyalakshmi Televisions, which he closed down after the death of his father. His father was a worried man as there was nobody to look after his eight and a half bighas (about two acres) of agricultural land; while two of his sons were away, working in Chennai and Rajkot, Bachubhai was busy churning out innovations after innovations. The wish of his father had to be fulfilled by Bachubhai, who realizing that his brothers would mostly be away had to forego his temptation to continue inventing.

Under the expert guidance of his father, he learned the nuances of agriculture for three years and after his demise has been actively engaged in it. His wife, Jayaben, recalled how after marriage, Bachubhai, seldom went to farm. She worked hard on fields and he sat in his *karyashala* pursuing all the experiments. She, however, does not miss a chance to take a dig at him jokingly and mentions that he does not know anything about agriculture and still it is she who guides him. Jayaben mentions that earlier she had no interest in her husband's innovations, '*temne khub paisa khoto kariya...hu khetar ma jaine kaam karati hati ane te ghar ma betha betha kai nu kai karata rehta hata*.'(Bachubhai was wasting money trying different things out while I was looking after the farm. He would stay in the house, tinkering with one or the other thing). She had once suggested him to look for jobs just like his younger brothers, instead of wasting time. But she now adds that had his father been alive, he would have been very happy.

Building the lever operated farm machine

In 2003, on hearing about his idea about a motorcycle operated agricultural attachment, his father quipped that if motorcycles would do ploughing, what would the bullocks do. He later improvised two motorcycles to build his own farm implements. It may be added here that Mansukhbhai Jagani of Amreli had already made similar agricultural attachment for Bullet motorcycle and had been awarded by NIF earlier. These subsequently got copied and replicated by fabricators of his village and nearby areas.

While planning to further improve the technology, he was reminded of his father's comment about bullocks. The idea of making the lever operated farm machine came from the rope tied to the bullock cart oxen. As one pulls the rope on the left or right side, the animal turns and when one pulls it hard, it stops. With this basic thought in the mind he set out to make his own design. It then took him four to five months laying out the blue print on paper and once every thing appeared correct, Ghanshyam bhai, his friend helped him in the fabrication work that took close to six months. Over all, he spent nearly Rs 90000 over a period of one year in its development.

The bullock kind of a tractor

To turn the vehicle, say for example to the left, the left lever is pulled in and the right lever is pushed in front. The front wheels that can turn close to 90 degrees help the vehicle to rotate almost at its axis at 360 degrees.The tillage implements are

mounted through a three point linkage system as in conventional tractors.The machine consumes about five litres of diesel in almost eight hours of work.

The 360 degree rotating technology is well known in prior art but the novelty lies in the control system and the functional levers, which act as a steering, clutch and brake system. For this farm machine, NIF filed a patent in his name in 2008. This farm machine is able to perform all the tasks a tractor can perform and that too at a fraction of its cost. One problem associated with conventional tractors is soil compaction due to their heavy weight. This machine prevents soil compaction due to its light weight. The story about his machine was published in The Hindu in September 2009 after which he received numerous enquiries about the same.

The saga of innovations

Bachubhai is known as 'Khopadee' (a brainy) in this small township. To many he may appear a persistent explorer of crazy ideas, but his reputation as a serial innovator has spread far and wide. His workshop and many unfinished projects testify to that. There is no dividing line between his living rooms, workshop and the junkyard. And yet, there is a serene orderliness in this chaos. His simplicity and humility becomes evident when he describes his experiences, in a very unassuming manner, not a trace of self-glorification or for that matter, no attempt to mask many failures.

There are a whole range of things that he has tried his hands on. The story of the radio transmitter he made is an interesting one. More than a decade and half ago, he started broadcasting, of course, on experimental basis at the same frequency at which local radio station was broadcasting its programmes. A case was filed against him and he was about to go to jail, when a local leader came to his rescue. His wife jokingly says, "May be the jail term would have saved him from toiling in the farm".

Among other things that he has made are a sugarcane juice extractor albeit of a smaller size, groundnut pod breaking machine, a motor coil winding machine, a manual pipe bender, slide projector for schools, a windmill, radio transmitter that works for small range, voice amplification system, a circuit for explosion, a metal stand used for tube well digging now innovatively used as a 'jhoola' at his house, motor lifting machine, etc. Interestingly, Bachubhai also claims to have made a helicopter thirty years ago. Similarly ten years later he made a motor operated mini model aeroplane, which is commonly shown in Durga puja pandals or other such melas.

Ghanshyambhai narrates how Bachubhai would come to his house now and then for fabrication related work. Whenever he had something new in mind he would share with him. He told us that Bachubhai stopped sharing his plans with villagers as they would always discourage him. That was the reason why the two of them became good friends, as even he was interested in all this. His two sons, Pankaj, the elder one who works in a bank in Rajkot and Alpesh, the younger who is a garlic dealer in Gondal (Rajkot), have been quite supportive and understanding. Bachubhai himself consults his sons in every experiment he does, evaluating the financial risks and taking their help wherever required. Some of his interesting works are described below.

Diversity of imagination and innovation

Four-in-one machine: The device has actually four functions incorporated in one machine and contains a generator, water lifting pump, a flour mill and an iron cutting machine. It operates on a three HP engine and depending on its usage, the consumption of diesel comes to about 1.5 litres per month. The

engine costed him Rs 8000 and the flour mill another Rs 2000.

A simple seed sowing rolling device: It consists of a cylindrical PVC tube with perforations at equal distance. The seeds are put inside the tube. An iron spike wheel is put on both sides of the cylinder sealed from both the ends using PVC caps. Using a U shaped rod, the device is rolled on the field. The seeds fall on the ground from the perforations. He made two models of the device, one with smaller holes for smaller seeds and the other one with larger holes.

Circuit for explosion: He made this 30 years ago at a cost of Rs 700, it provides 500 V power for exploding dynamite sticks to dig open well in hard rock area.

Bulb that you can call your own: The modified bulb of Bachubhai elongates the life of the bulb many times due to a small circuit that he inserts. The light is good for farm though not for home because of slight quivering effect. He has been making and selling such bulbs for the past twenty years. To prevent theft, he also puts the name chits of the owner inside the bulb. Idea of chit evolved because of frequent theft of these long lasting bulbs. The chit does not burn but gradually the ink fades with time. He sells these bulbs at Rs 15 after modifying the ordinary bulb available in the market at a lower cost. *A rural innovator modifying the technology developed by large corporations!*

Motorcycle Plough Scooter Wheels in Rear: In 2004, he made a santi (multipurpose tool bar) using a Suzuki Max 100. He fitted the tyre of a scooter in the rear instead of the original wheel to get more stability during agricultural operations. Two smaller wheels were put besides the motorcycle to balance the vehicle in the field so that the driver does not need to put his legs down every now and then. The modifications in the Suzuki Max 100 cost him nearly Rs 4000. Later he replicated the same in a Hero Honda motorcycle making certain other changes.

Electricity Tester: This device can test current without touching wires and can be used even for concealed wiring up to one-inch depth. Detecting current, the tester shows light and also gives a mild alarm. He made this five years ago at a cost of Rs 50. This is very useful for detecting breakage of concealed wires.

Metal Comb: He saw a somewhat similar comb being used in Rajkot and replicated the idea in his home. The device is a simple metal comb, which is used for removing the chickpea pods from the plant.

Herbal loosener: Using extracts of a couple of herbs, he has developed a formulation that loosens rusted nuts and bolts in almost no time.

Though many of his innovations may appear simple and not uncommon, yet it is the sheer ability of the person to think creatively and solve the problems faced by him, which is highly appreciable. Not looking at others to work out a solution, he himself goes ahead and finds one. Bachubhai is now busy making a remote control tractor. The frame is similar to the rotary tractor and he is planning to incorporate circuits in it to make it remote operated. Maverick at work again!