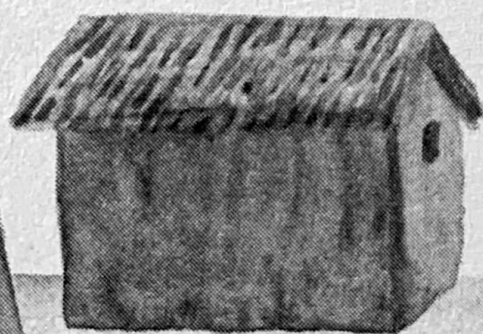
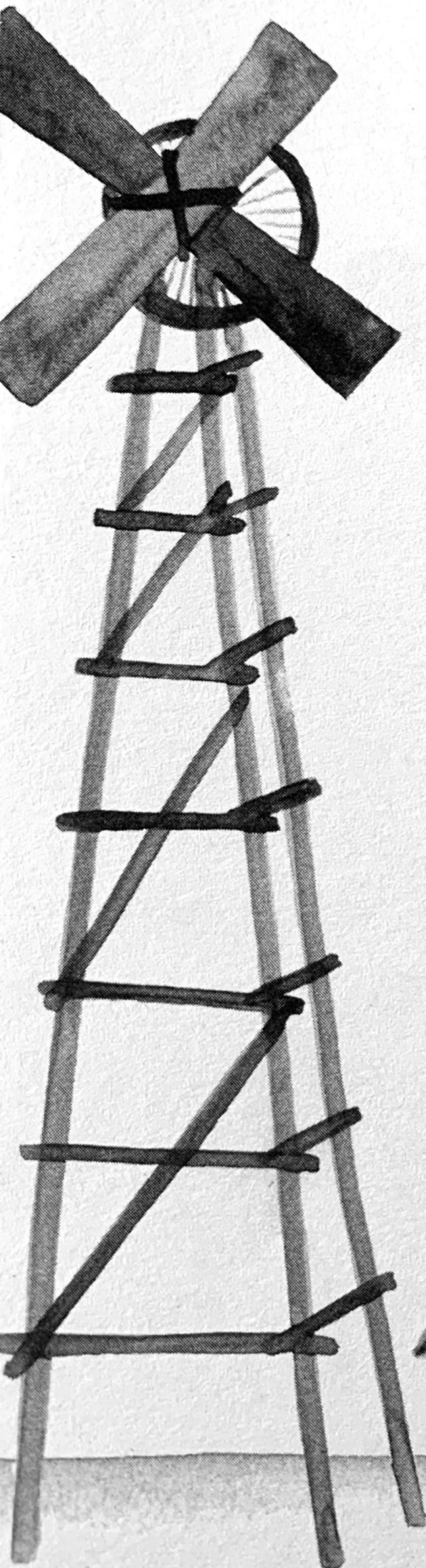


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WILLIAM KAMKWAMBA

THE BOY WHO BUILT WINDMILLS

William put down his hoe and wiped his brow. It was only 7 a.m. but he was already sweating beneath a cloudless sky and white sun. Blue gum trees shimmered in the heat. He looked at his morning's work – long ridges of dry, red earth ready for planting. His stomach gnawed with hunger. He had woken at 4 a.m. to come to the fields in the cool, but there hadn't been enough grain for him to have porridge. It was almost time for school. Perhaps this would take his mind off his empty stomach.

It was November 2001. Fourteen-year-old William Kamkwamba was helping his father in the fields.

William lived with his parents and six sisters in Masitala Village in Wimbe, Malawi. His father was a farmer who grew their food and a little tobacco to sell. Their last maize harvest had been very poor and they now only had five sacks left instead of the usual full grain store. The previous December's rains had arrived late and caused floods. Then the rains had stopped and the country had been hit by drought. This change in weather patterns was due to climate change and it had damaged the precious maize crop they relied on during the 'hungry season' – the period from October to February when nothing is harvested from the land. William wondered how they would survive until March, when the first maize would be ready to eat.

Life was tough in his village. William's mother spent an hour each day drawing water from the well, while his sisters could spend three hours collecting firewood from the forest. William wanted to study science so he could become an engineer and make life better for his family. Ever since he was small, he had always been curious about how things worked. He had taken apart his father's old radio and fixed it, and by the time he was 13 he was regularly repairing radios for neighbours. He knew he needed to do well in secondary school to achieve his aim, but his grades

were disappointing. He wished they had electricity so he could study in the evenings.

By December, the family was eating just one meal a day, and William's only distraction from hunger was his excitement about starting secondary school in January. But when the time came, he was only able to attend for a single month, because his family could not afford to pay the fees. Across Malawi, the famine was getting worse. William saw the look of worry in his parents' eyes. They were forced to sell their goats and use the last of their savings to buy extra grain.

William missed school terribly. He would wait for his friend Gilbert each afternoon, eager to see his notes and hear what he had learned, until the school itself closed due to the famine. William became a regular visitor to the small community library. He always chose science books and was fascinated to learn about electricity. Many of the books were in English, so whenever he didn't understand the words, he asked the librarian to help him. Then one morning, he picked up an old textbook called *Using Energy*. It had a picture of wind turbines on the cover, and turning the pages, William read that these could be used to generate electricity and pump water from deep underground. In that moment, he had a dream. Now he knew how to provide light for

his family and water so they could always grow food regardless of the rains: he would build a windmill.

By the end of March, the first young maize was ready to eat at last. William's family were grateful to have survived the famine, but many others weren't so lucky. It had been the worst in Malawi's history and many hundreds of people had died.

School reopened in May and William tried to sneak back into lessons, but he was eventually found out and asked to leave. William was unhappy, thinking he had no hope of becoming anything more than a poor farmer, so when he wasn't helping his father, he threw himself into his windmill project. Now the local junkyard became his favourite place. He saw treasure in the things that people threw away. He collected anything that might be useful – wooden poles, old pumps, broken pipes, worn-out shoes, copper wires, car batteries, his father's battered bicycle – and stored them in his bedroom. Children from school told him he was dirty for scrabbling around in the junk. His mum was horrified that he would hoard scrap in his room. His sisters hovered at his door, wanting to know what he was doing. William told them all to wait and see.

First, William tested his idea by making a small windmill with blades made from a cut and flattened

plastic tub and an old radio motor as the generator. He was thrilled when he held it to the wind and the spinning blades generated electricity to power his radio. Now he would make a bigger one. He worked in secret, away from the house, but Gilbert, and William's cousin Geoffrey, often came to watch. When William couldn't find parts, he made them himself. He cut PVC pipes, heated them and pounded them into shape to create blades, and flattened beer bottle caps to use as washers. He planned to use the spinning blades to turn the back wheel of his dad's cut-down bike, but there were some things he still needed to buy to finish the windmill – nuts and bolts, and a bike dynamo to make the generator. He had no money to buy these things. It looked like he might have to abandon his dream. Fortunately Gilbert refused to let that happen. William's friend used the little money he had to buy everything William still needed. The project was back on.

The finished windmill was nearly three metres wide. Now William needed to raise it into the sky where it could catch the most wind. His friends helped him chop down some tall blue gum trees. They stripped off the branches and, with nails donated by Geoffrey, built a tower about five metres tall outside William's house, with branches nailed across its legs to make a ladder.

At last William was ready to fix the windmill to the top. William's family and a crowd of people from the village who had noticed the tower gathered below to watch.

With the help of his friends and a pulley and rope, William hauled his contraption to the top of the tower and fixed it securely in place. Then he carefully pulled away the old bike spoke he had used to jam the wheel to stop the blades spinning. The four blades turned slowly at first, then spun faster and faster as they caught the wind. William clung tightly to the wooden tower as it began to rock. He slowly pulled a lightbulb from his pocket. Holding his breath, he gently attached the wires from the windmill. William held out the bulb in his hand. There was a flicker ... then another ... then a bright, steady light. The crowd below cried out in amazement. William had made electricity from the wind!

News of William and his windmill spread quickly. Every day, dozens of people came to see it, with its bulb glowing bright. William's parents were so proud of their son.

Over the next four years, in between farming duties, William continued to extend his project. He rigged up wiring so that he had light in his bedroom; the switch was made from plastic piping, rubber from old flip-

flops and some springs. Then he improved the design of his windmill so that it would turn faster and generate more electricity. Now he was able to power lights for the whole family home, as well as two radios. In the evenings, he, his parents and sisters could now read, sew and listen to their favourite programmes. William adapted a car battery so that they could store energy, and there was often a queue from their house to the road as people waited to charge their mobile phones.

William's parents still didn't have enough money to pay for him to go back to secondary school, but his old primary school teacher asked him if he would run a science club for the students there. William was keen to show children that they could make things too, so he built a small windmill in the schoolyard, which powered a radio. The children were amazed as William explained all about electricity. Then one day, when William was 19, an education official, Dr Hartford Mchazime, visited the school and spotted the windmill. He was surprised and impressed to learn that it had been built by an ex-student and went to meet William straight away. Dr Mchazime was able to help William return to school, and news of the boy and his windmill spread across Malawi.

As a result of the internet coverage, William was

invited to join a TED conference in Arusha, Tanzania, for young innovators. It was the first time he had flown in an aeroplane, something he could never even have imagined doing. At the conference, William was interviewed onstage about his windmill, and millions of people later watched the talk online. Thanks to this, he was able to raise enough money to build a second windmill and buy a pump to irrigate his family's vegetable garden. William's dream had finally come true. He had given his family security against hunger.

One of the TED conference organisers, Tom RIELLY, was so moved by William's story that he offered to pay for his education for the next seven years. So after finishing secondary school William attended Johannesburg's African Leadership Academy, whose students are young future leaders from all over the continent. From there, he studied environmental studies at Dartmouth College, one of America's top universities.

Today, William works as an engineer, splitting his time between Malawi and California, and is invited to speak all over the world. He has paid for his sisters and cousin to go to school, and set up a charity called the Moving Windmills Project to support others in his community. Through this, he has helped to fund a new secondary school, as well as solar, wind and

biogas projects and transport. His Moving Windmills Innovation Centre gives other young people the opportunity to become innovators too. Most recently he has created online teaching materials to help students in other developing countries find ways to solve problems for their communities.

With patience, skill and enormous determination, William has achieved incredible things. Inspired by a picture in a library book, one young boy's dreams have built not only windmills, but a better future for countless people all over the world.