

## The Future, Dear Boy

2nd April 1895.

Canning Town, London, United Kingdom.

It would be an overstatement to suggest that Joseph Wester knew what he was doing from the outset, just as it would be an understatement to suggest that what he achieved was little more than guesswork. His discovery, then, belonged somewhere in between the two in a no-man's land of hopeful pottering, or indeed of trial and error. It had also come about, like so many discoveries over the lengthy and tumbling course of human ingenuity, by lucky accident. Isaac Newton had his apple-induced headache to thank for his musings over gravity. Wilhelm Roentgen had his cathode ray tube and a sore hand to thank for his X-rays. The lucky accident for Joseph Wester came in recognising how the tiny chunk of meteorite he had found in Evanston, Australia the year before could block a magnetic field.

But first, let's be clear about a few key matters. Joseph Wester grew up as Little Joe, an average boy from an average working-class family, with an average education and average expectations. His father was a foreman at the Albert Dock on the River Thames, in charge of a gang of twenty-eight strong men who unloaded cargo ships from around the world with thick ropes and timber wagons. His mother was in charge of no one, and cleaned both beds and bed pans at The London Hospital in Whitechapel.

Little Joe was destined to leave school at

fourteen and be a docker, if ever he put on any weight or some muscle. But Little Joe would sit in his classroom at the Holy Trinity National School and watch the open sky, busy with wheeling gulls and scudding clouds and wonder where each was going. Of a weekend he would dangle his thin pale legs over the edge of the quayside, listen to the conversations of the burly dockers as they lugged cargoes to the rail yard, and watch the passenger ships slide regally up and down the Thames and dream about the distant countries from which they came.

Over time he became an eavesdropped expert on the world that came to visit by sea: the deserts and pyramids of Egypt, the tea plantations of India, the rice fields of the Far East and the bountiful new world of America. But mostly what excited his interest was the gold rush taking place in Western Australia, where men returned with pockets of gleaming nuggets and the start of a significantly more prosperous life. So when Little Joe reached the age of fourteen, and the school gates closed and the dockyard gates opened, he left a pencilled note on the kitchen table, stuffed a loaf of bread, a flask of tea and the family savings jar into a sack, and slipped aboard a steamer bound for Fremantle.

On the two-month voyage from London to Australia he stopped being Little Joe and arrived on the other side of the world as Joe Wester. He felt bigger and stronger, fortified by eight weeks of stiff oceanic gales and scavenged leftovers, and stepped from the gangway of the SS Australasian marginally older but more worldly travelled, as indeed he now was. He strode along the extensive Fremantle quayside, which he found just as busy as his London equivalent but far hotter and drier, and drank in every detail of this new

but familiar environment as much as he did the warmer drinking water. At the end of quay was an office for the New Elizabeth Coach Company and he exchanged the last of his money from the savings jar for a single ticket north to the goldfields. He arrived two days later, tired but excited, in a world of dry, red dirt and a fierce, oppressive heat, in a tiny town twelve miles north of the significantly bigger and more prosperous town of Kalgoorlie.

The town comprised six tin sheds and a timber sign. On the front of the sign the name Evanston had been painted in big, black letters. Insomuch as six tin sheds and a sign could be called a town, it had nevertheless been founded three years before by a Welshman named Jimmy Evans as an inexpensive alternative for hopeful prospectors. Each of Evans' sheds sold something different, from timber-framed tents to mugs of warm beer. Eleven years later Jimmy Evans had made his money from exchanging his various products and services for other people's small finds of alluvial gold. He sold the town to a banker named Conaghie and left the goldfields as a very rich man, with the singular distinction of having never once got his hands dirty. He boarded a steamer back to Wales under the more prosperous name of James W Evans, where he bought a country estate in Monmouthshire and fathered seven children, five of them legitimately.

Some of the Evanston prospectors were good natured and welcoming of the newly arrived fourteen year old boy, and would show Joe how and where placer gold might be found in exchange for digging and hammering their iron-like ground. Other prospectors, however, were surly, aggressively protecting their

claims, especially if they'd found any gold at all.

So Joe Wester spent much of his time alone, shivering beneath dusty canvas by night and avoiding death from heatstroke and brown snakes by day. He struggled to find little more than flakes of pocket gold, as it was called in Evanston, just as many of the others similarly struggled around him. He found some small nuggets from scratching around in the dirt, but these he usually exchanged for canned food and preserves in Evans' sheds. Some prospectors dry panned, others wet panned, and some experimented with a dilute solution of cyanide. Men arrived daily, just as he'd done. Some left within a year. Some never left and are still lying there to this day.

When Joe Wester found his tiny chunk of meteorite it looked like a black tennis ball that had been trampled by a horse. It resembled a sun-baked kangaroo turd, and of all the places in the world one may want to find and examine a sun-baked kangaroo turd, the Australian outback is probably the best. But what caught Joe's eye with this particular turd, when he saw it lying beneath a mulga tree, was how it sparkled in the hot Australian sun.

When Joe picked it up, it was hot, dense and heavy. He turned it over in his hand and marvelled at how keenly it glittered. At the time he'd thought it nothing but a pretty rock, something common to the endless expanse of the Australian outback. When he tried three days later to exchange it for a week's rations of beans and bread, Jimmy Evans had laughed so hard that he'd had to sit down. Then he'd yelled out to the other customers something along the lines of how this dumb kid had actually managed to somehow polish a

turd, something Joe hadn't understood at the time. He had left red faced and empty handed, but for the shiny rock that he had stuffed back into his pocket.

Over the next three months Joe Wester struggled to find enough pocket gold to keep himself fed and watered. When the Australian winter turned to summer and the outback temperature rose close to fifty degrees, Joe Wester exchanged his last tiny nuggets of pocket gold for a coach back to Fremantle and then a steamer ticket home.

After an angry and tearful reunion with his father and mother, William Wester quickly found him work at the Albert Dock, carrying sacks from incoming ships and pushing barrows for outgoing. It was hard work with long hours but it paid a regular weekly wage, which was more than could be said for the Australian outback. Plus the climate was temperate, and there were no venomous snakes.

His tiny chunk of meteorite sat glittering on his nightstand as a souvenir of his tough year in the inhospitable antipode. He would look at it each night when he climbed into bed and wonder if maybe he'd made the right decision in coming home, or that maybe if he'd persevered through the furnace-like summer he might just have stumbled upon one of those rare huge finds, like the famous Golden Eagle nugget that Jim Larcombe had found in 1931, which was so big that it took two grown men to lift it.

But he continued to work at the docks, and each night his back would ache and his legs would burn, his knees would crack and his hands would bleed, and every night he would stare up at his ceiling with his sore hands behind his head and wonder if there was not

a better way to load and unload sacks and crates that didn't require pulling on ropes and hauling wagons. There were steam engines at the docks, and new electric machines, but they were noisy and cumbersome and slow. He was convinced that there must be some other way, something quieter, something sleeker and faster, something that wouldn't burn blisters into his hands. Without a science degree Joe had no idea what that something might be. And surely, he reasoned, there were more than enough learned men out there who would know what that thing was if there was indeed a thing to be known.

There was an ironmongery at the heart of the dock and Joe had taken to exploring it during his lunch break. It was there that he discovered the wonder of bar magnets. At first he was amazed by their magnetic properties - how they attracted and repelled one another - and quickly became curious about how they behaved with all the different metals at the various yards. There was a machine in there somewhere, he would think, a machine where magnetism lifted and carried heavy cargoes from the ships. But without the right scientific knowledge and learning Joe was only slightly more than hopeful of finding anything at all, and his dreams remained just that.

And so, of course, the lucky accident happened. Joe had liberated a selection of bar magnets from the ironmongery and had taken them home, along with pocket-sized scraps of some of the more interesting metals, with the intention of having more time to experiment.

On this particular night, he had left some of the magnets next to the chunk of meteorite on his

nightstand while he slept. In the midst of a violent nightmare Joe had thrashed at his bed sheets and knocked everything from his nightstand to the floor. Come morning, Joe had risen to find some of the magnets lying next to each other beside the meteorite. They were close together, closer than normal, but none of them were being attracted or repelled.

Joe had been frustrating himself enough the night before with the bar magnets to know that something wasn't right. He sat for several minutes just staring at them on his bedroom floor. Eventually he leant forward and nudged one of the magnets away from the meteorite with his finger. When it was more than a few inches away, the magnet shot across the floor and loudly snapped against another one, just as it was supposed to do. Joe had jumped back as they'd connected. His curiosity spiked, Joe slowly clawed the two joined magnets back towards the meteorite. As they came within a couple of inches of it, the two magnets gently came apart.

Joe spent the next hour at his table recreating the same experiment over and over, and each time the result was the same: the bar magnets experienced no magnetic properties whenever they came within a few inches of the meteorite. His knowledge of science was severely restricted to what he could remember from his school lessons, but he was pretty sure that nothing could block a magnetic field, despite what he was looking at. Whatever the meteorite was made of, it was something previously undiscovered on Earth, and of that he was equally certain.

He suddenly felt important, and concluded that if only he knew of its existence then he should be the

one to name it. He decided, therefore, to name it after himself, and called his new element Westerite.

Two additional thoughts came into his head as he sat at his small bedroom table: 1) how could he get more Westerite to perform bigger experiments, and 2) how much more might he need if he did manage to actually invent something? The answer to his first question was easy: you couldn't make elements, so if he needed more he would just have to find more. But his own piece of Westerite had come from outer space and had landed in the Australian outback. And just because he had stumbled upon it, it did not guarantee that there would be more of it just lying around on the ground - there could be Westerite meteorites all over the world or there could be none. The second answer was not so easy: at the moment he had no invention, just something very special happening right in front of him.

For now he still had to work at the dockyard. So he took the meteorite, wrapped it in one of his undershirts and hid it beneath a floorboard under his bed. The rest of the day he spent thinking about Westerite and magnets as he unloaded crates of tea and pushed barrows of grain. Yet as he pushed his barrow back and forth along the quayside, so he kept staring down at the single wheel at the front, forever going round and round. At eight pm when it grew dark and his day was done, Joe parked his barrow, stealthily removed the front wheel, and carried it home beneath his shirt.

That night Joe quietly carried his father's toolbox up to his room. In his head Joe had seen the device that he had wanted to create. It was a wheel,

a rotating wheel that never stopped, a wheel that did useful work without ever needing fuel. What he intended to construct would be crude, of course it would, but it would be a start.

He retrieved his chunk of Westerite from its secret location beneath his bed. His small bedroom table would be the base of his invention and the barrow wheel would spin horizontally above it. He drilled a hole the same diameter as the wheel's spindle through the table top, inserted the spindle, and secured it in place. Then he lowered the barrow wheel over it so that it spun freely when he pushed it. The unintended vertical angle of the wheel, however, meant that it just about managed one complete revolution before it juddered to a halt. But no matter. He had begun.

Joe attached a bar magnet to one of the barrow wheel's cast iron spokes, and then experimented with the placement of a second magnet on the table . He needed to see how close they had to be before they repelled one another. Then he slid the Westerite beneath the wheel until it blocked the magnetic field of the spoke magnet. Then he slowly turned the wheel until the spoke magnet was far enough away from the Westerite that its magnetic field returned. As it reached the critical point, it suddenly became repelled by the table magnet and Joe felt the whole wheel jolt in his hand.

Still holding the wheel, Joe manually turned it a full revolution until the spoke magnet was once again above the Westerite and, as before, its magnetic field disappeared. He continued to slowly turn the wheel. The magnetic field of the spoke magnet suddenly returned and, as before, the two magnets repelled each

another, and the wheel once again jolted away.

Joe sat back amazed. His heart was thudding with excitement. It had worked! The wheel that he had seen in head was pretty much what was on the table in front of him.

Holding his breath he pushed the wheel and let it spin awkwardly under its own momentum. What he thought would happen actually happened: the spoke magnet was not repelled as it approached the table magnet, but was instantly repelled once it had passed over the Westerite. The wheel continued round under its own velocity, albeit jerkily, but it was enough to bring it full circle, back to the place where the table magnet repelled it once again. It did this again and again, each time just making it before being fired off again.

Joe Wester knew at that point that he had just built the impossible: a perpetual motion machine. It was ugly, there was no doubting that, but it required no fuel or any external input other than a shove. It was also entirely reliant on his meteorite of unknown origin, the source of his newly discovered element Westerite.

The wheel continued to spin jerkily in front of him, shooting away when the spoke magnet passed the table magnet but shuddering almost to a halt after each complete revolution. Round and round it went, and Joe happily watched it for some time. What he needed to do next, he thought as he watched, was to use a better wheel, something less clunky, something that turned more smoothly from the start. What he spotted the following day at work was one of the pulleys at an unloading station. Specifically what Joe noticed, as he watched it turn back and forth with the rope runner, was that it didn't wobble, squeak or deviate

in any way. But taking a pulley wheel was not going to be as straight forward as taking the wheel off his own barrow, so during his lunch break Joe disappeared to the scrap area, or the maritime boneyard as it was called, and hunted for an old, discarded pulley. He found one, a cast-iron wheel with long curved spokes and a spindle attached to a frame. It had a crack but that didn't matter. He wrapped it up, hid it just inside the entrance to the boneyard, and smuggled it home at the end of his shift.

Well of course his new perpetual motion machine worked even better than his clunky barrow one. The pulley wheel spun so silently and so quickly that Joe wondered after a few minutes just how he was going to stop it. In the end he simply removed the table magnet and let his wheel slow to a halt. But now he had an entirely different dilemma: what did he do with it?

Most of the buildings along the Victoria Dock Road were wharves and warehouses that Joe passed on his walk to work, but there were a few factories. One of these factories produced machines for industry and agriculture. The company was called the London Engine Corporation and it seemed ideal. Over the next few days Joe would look in as he walked past the factory gates, and see half-built tractors, Archimedes irrigation screws, cast-iron augers and steam shovels in the midst of manufacture. They all suddenly seemed so unnecessarily large and heavy. He would think of his magnetic rotary wheel sitting at home on his small bedroom table, and his head would fill with all the possibilities of how it could replace these burdensome and noisy contraptions.

It was on a Thursday, as he made his way home, that he made the decision to present his wheel to them. He would enter the factory the following morning and make an appointment to demonstrate it to someone of importance. He would call it the Wester Magnetic Rotary Wheel, and they would see it and be amazed, just as he had been. It would revolutionise their bulky and jarring machines that relied on burning coal or diesel fuel, that belched black smoke and other pollutants, and it would replace them with something better and cleaner and quieter.

The following morning Joe rose early, washed and dressed in his cleanest work clothes, and fairly sprinted through the streets to the black iron gates of the London Engine Corporation. He entered, and approached one of the huge buildings that had just one door at the front. Above the door was a simple black and white sign that read 'Entrance'. Inside was a man writing busily at a desk. The man was dressed smartly in a dark, pin-striped suit and wore severe glasses. His black hair was slicked with pomade to a neat side parting. He glanced up with a frown of surprise as though he had forgotten that part of his role was to intercept visitors. He briskly looked Joe up and down and made the assumption that he was part of the corporation's younger workforce.

"You shouldn't be here," he said curtly. "Workmen are at the back. Boys too."

Joe hesitated, and then stepped closer to the man's desk.

"Excuse me," Joe said, "but I wanted to see someone. I have an invention, you see. I think your company might be interested in it."

The man looked him up and down again, puffing with irritation, and frowned more deeply.

“I don’t think so,” he said. “You’ve made a mistake. We make engines here. Mechanical engines. We don’t need inventions.”

Then he continued writing in his book.

Joe stood still, not knowing what to do next. The room was silent but for the exuberant scratching of the man’s pen. Eventually the man stopped writing again and looked up. He seemed more frustrated that Joe was still there.

“Is there something else?”

“My invention,” Joe tried to explain. “I wanted to show it to someone. I thought someone might be able to use it.”

“An invention?” the man repeated. He adjusted his glasses. “What do you mean?”

“I invented a wheel, a perpetual motion wheel. You see, it uses no fuel, no coal -”

“A wheel?” The man behind the desk sounded like one of those annoying mynah birds from India, repeating everything but without understanding.

“Yes, a wheel. I wanted to show it to someone. Is there anyone I could see? You know, make an appointment.”

The man made a huffing noise and seemed put out. He shuffled some papers on his desk.

“Name?”

“Pardon?”

“Name. What is your name?”

“Oh, my name is Joe Wester. Joseph Wester.”

The man made another huffing sound and began to scratch his pen across his new bits of paper. It

appeared that this seemed to be an end of the matter, but then the man stopped writing and looked up at him once more.

“Monday,” he said abruptly. “Be here at eight am. Mr Jacklyn will see you. Bring whatever it is you have invented -“

“A wheel.”

“- bring it with you and Mr Jacklyn will look at it. There will be no contracts of interest of any notices of implied obligation, you understand. Your meeting will last thirty minutes. I suggest you prepare. Good day.” And then he went back to his writing.

Joe turned then and left the room, back out into the bright early morning light. The clanking sound of heavy manufacture filled the air, and he strode back to the black iron gates with a sprightly gait and a distant thought that he might not be a part of all this industry, but of a new industry, a clean and better industry. Even throughout his long day’s work of sack lifting, rope pulling and barrow shunting, Joe Wester dreamed that he had made a first step towards something else, a step towards true ingenuity and discovery.

The next three days dragged. Come Monday morning he covered his small table with its pulley wheel and magnets with his bedsheet, and lugged it through the streets of Canning Town to the confused gazes of his fellow workers, all of them making their usual route to the Albert Dock. But Joe knew that he wasn’t one of them today. Today he was an inventor, and he was about to unveil his impossible invention to Mr Jacklyn of the London Engine Corporation.

The man with the smart suit and the severe glasses and the slicked black hair was still writing in his

book when Joe appeared before him with his covered table. The man looked up, gave him his customary frown, and indicated a chair with his pen without uttering a word and then continued his writing. Joe carried his table to the waiting area and sat down.

The clock on the wall read seven fifty. For ten minutes there was no sound but the relentless and vigorous scratch of the man's pen in his book. At eight am a far door opened and another man walked in. He was wearing a black suit and an extravagant moustache. He mumbled something barely audible to the man with the pen, and then they both looked over at Joe and his table wrapped in a bedsheet. Then the man walked towards Joe with his hand begrudgingly outstretched.

"Is there something I can help you with?" he asked.

Joe stood up and nervously shook the man's hand.

"I hope so. Are you Mr Jacklyn?"

"I am indeed."

Joe indicated his covered table. It didn't look quite as amazing as it had in his bedroom. Now that he had brought it into an actual manufacturing plant Joe wondered whether he had made a huge mistake. He imagined laughter. Or anger.

"I've invented a wheel," Joe began. "I can take the sheet off here to show you. Or perhaps in another room, to show you how it works?"

Mr Jacklyn chortled, as one might do when witnessing a puppy with a new and pointless trick.

"You're a little late," he said. "I believe the wheel was invented some time ago. By the Neanderthals, if I'm not mistaken."

It took a moment for Joe to understand just what Mr Jacklyn had said to him.

“No, not the wheel itself,” Joe said, for fear Mr Jacklyn would turn right around and march back through his door. “It’s a perpetual motion machine. I invented it. The wheel will turn forever, without any diesel or coal or anything.”

Mr Jacklyn stopped chuckling. Then he made a frustrated, huffing sound similar to the man with the pen had done.

“Young man,” Mr Jacklyn began, his tone laced with irritation and lecturing like Joe’s old school teacher, “a perpetual motion machine is impossible, on the grounds stated by the first and second laws of thermodynamics.”

Joe felt his face burn red. He knew that he’d needed a science degree. He didn’t understand what Mr Jacklyn had just said, but now he was beyond certain that he was way out of his depth. Mr Jacklyn became aware of Joe’s embarrassment and softened.

“I have no doubt that you think that you’ve invented a perpetual motion machine, but the universally accepted theorems -”

“It goes round and round without stopping.”

Mr Jacklyn fell silent, studying him.

“Is it a water wheel?”

Joe shook his head.

“Steel balls on sliders? Something that involves a continuous shift in weight towards an axle?”

“No, sir, I did it with magnets,” Joe explained. “You see, I have two magnets that repel each other, but then I block the magnetic field at one end -”

Mr Jacklyn huffed again.

“It is impossible to block a magnetic field,” he lectured again, as though he was explaining the alphabet to a village simpleton. He took a step away then, back in the direction of his door, his time wasted enough.

“But I watched it go round and round for fully five minutes before I had to stop it,” Joe said quickly, fearing that this meeting was about to be over before it had even really started.

Mr Jacklyn stared at Joe for a long time with his lips pressed tightly together. A thousand different thoughts seemed to be going round and round inside his head, like Joe’s wheel had gone round and round on his bedroom table. Then he looked down at Joe’s table, wrapped inelegantly in his bedsheet. Finally he took a very deep breath and relented.

“Very well,” he said. “Bring it through. But if there’s any hidden apparatus, batteries or electric or such, I will be very angry.”

He led the way back through the door from which he’d first come and Joe followed behind with his table. He followed Mr Jacklyn into another room where he set his table down and finally removed the bedsheet.

Joe pulled a bar magnet from his pocket and secured it to the table in the place where he’d marked whilst he held the wheel steady with his other hand.

Mr Jacklyn had crossed his arms impatiently and looked ready to point out the one obvious part that Joe had missed. But when Joe gave the wheel only the gentlest of spins Mr Jacklyn’s jaw dropped, and he stared open mouthed as it spun rapidly up to its silent full speed.

Mr Jacklyn examined every detail of the Wester Magnetic Rotary Wheel from many different angles as it continued to spin quickly and silently. He studied the pulley wheel, he studied the table magnet, he studied the space beneath the table, and he studied the tiny chunk of glittery black rock that seemed to be the secret of the entire device.

“How is this possible?” he wanted to know, unable now to look away.

“By blocking the magnetic field of the spoke magnet -“

“I’ve already said that that’s impossible,” Mr Jacklyn exclaimed, looking at him for the first time since the wheel had first started spinning. “A magnetic field cannot be blocked. It can only be redirected. If you were older you might know these things.”

Joe was at a loss. He had no way of explaining what he’d done and simply looked at his wheel spinning round and round. Mr Jacklyn was at a loss too, and he also just looked at the wheel. In the end it seemed apparent that what they were both looking at was indeed impossible. But that didn’t help either.

“I think some other people need to see this,” Mr Jacklyn said at last. “Would you wait here, please?”

Joe Wester said that he would, and watched as Mr Jacklyn hurried from the room. Mr Jacklyn reappeared ten minutes later with three men who were chuckling with amusement as they entered one after the other. Their amusement dissipated, however, as Mr Jacklyn indicated Joe’s wheel with outstretched arms, as a magician might show off the neat ending of a magic trick to a paying audience, and then they each in turn examined it more closely.

"This is absurd," said one of the men.

"Obviously a trick," said another. "There's an electric wire running through the wood. I've seen it before."

"Should we call the police?"

But the more the three men looked, the less absurd and the less like a trick it became.

"You know," the third man said at length, stroking his elegant silvery chin whiskers. "I think this is just what Mr Vance might be looking for."

The other men nodded in agreement.

So Mr Vance was sent for, and after another ten minutes a fifth man came through the door. He neither chuckled nor really spoke, but spent several minutes just watching Joe's wheel spin round and round from many different angles. Then he looked over the top of his round metal spectacles at Joe.

"We can't pay you for it, of course," he said. "But we can offer you a royalty. Ten per cent. No more. It's a fair offer, I think you'll agree."

Joe had no idea what that meant. He still felt massively out of his depth, standing in a meeting room of a big manufacturing corporation with five men in smart suits. And ten per cent of what? Whatever it was, it was better than a red face of shame and assistance back out onto the street via a boot up the backside.

Joe felt he should hold his hand out to shake Mr Vance's hand. It seemed the right thing to do. Mr Vance took it and shook it heartily.

"What will you do with it?" Joe asked at length, wondering whether he should perhaps have asked this question earlier. "Will it replace the steam engine?"

"Good Lord, no," Mr Vance said. "This is for

my department, you know, not theirs.” He indicated the other four men with an upward nod of his head. “My department is new. It is born from ingenuity and discovery. Not mired in the old and clumsy.”

Joseph Wester felt a warm glow begin to radiate inside him. He liked the sound of these words.

“Can I ask the name of your department?” Joe enquired, his eyes now wide with wonder.

Mr Vance grinned enthusiastically, and slid a fatherly arm around Joe’s narrow shoulders.

“Why, the future, dear boy. Robotics.”