

INDOMITABLE

JE RÓNIMO DE AYANZ

1553-1613



Fundación

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Eloísa Ramírez Vaquero, Francisco Falcone

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JERÓNIMO DE AYANZ

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WRITING: VANESSA LIZARRALDE

ILLUSTRATIONS: NURIA HACHE



ADVOCATE

Letter from the Project's Advocate to the Legacy of Jerónimo de Ayanz.

The advocate of each publishing project in this collection is selected by the Board of Trustees of the TW Foundation for **promoting universal values through their knowledge, endeavors, and way of life.**

Respect, honesty, justice, solidarity, equality, freedom, responsibility, and peace help us become better.



Dear little great reader,

It is a pleasure to introduce you to the story of Jerónimo de Ayanz, an exceptional man from Navarra whose accomplishments have left an indelible mark on the history of science and engineering. He was not only a poet, musician, cosmographer, soldier, and inventor; he was also a true entrepreneur. Ayanz invested in his inventions and their practical implementation, displaying a forward-thinking business profile, ahead of his time. His ideas were not just dreams; he made them a reality, facing challenges with determination.

I relate this process to cycling, as it is one of my passions. Having a great idea is like imagining the top of a mountain: exciting, but just the first step. To reach the goal, you need effort, preparation, and belief in yourself. Just like in sports, Ayanz had to work intensely, not let difficulties discourage him, and maintain an indomitable spirit. His commitment to progress and the common good led him to leave a legacy that still inspires us today.

Because, like Jerónimo, we all have the ability to develop solutions that can transform the world around us, if we have the courage to believe in it.

Warmly,

Antonio Catalán Díaz

Founder of NH Hotels

President of AC Hotels by Marriott



Once upon a time, there was a boy who was called “Dreamer,” because he kept thousands of ideas in his head, all shaped like gizmos.

Jerónimo lived happily with his brothers in a huge palace in Guenduláin. At that time, Spain was shining brightly in the world, which is why we now call it the Golden Age.





Every morning, Jerónimo would climb the mountain to play with his friend, the wind. There, it blew so strongly that it swept him down the slope at lightning speed.

One day, I'll get you to take me all the way up to the sky, he would shout as he ran back to the top...

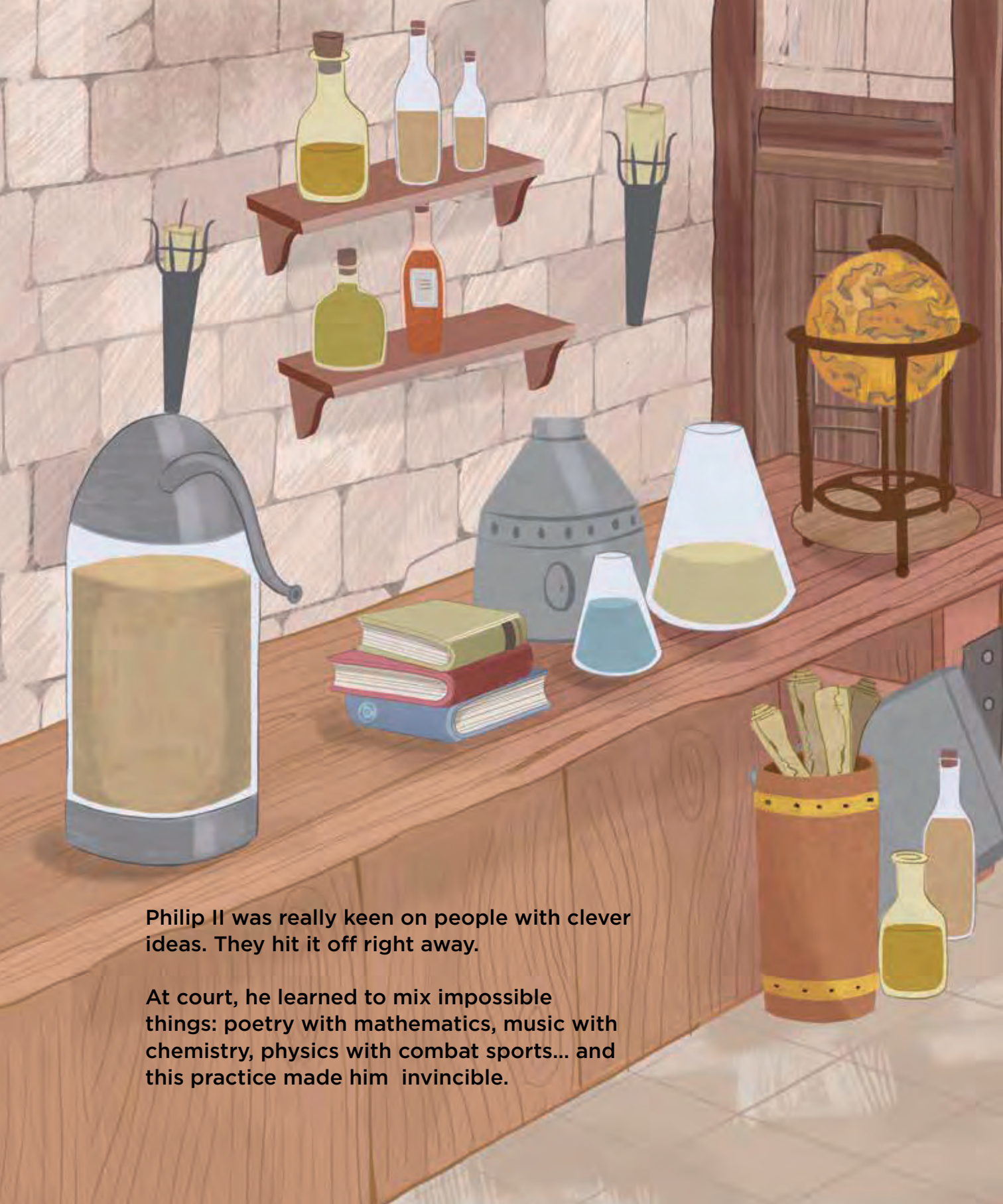




Our boy ran and ran... while he grew and grew..., turning into quite a strong, good-hearted lad.

When he turned 14, his father told him he had to leave the palace. It turns out that in the Golden Age, the eldest son kept the whole palace, every last bit of it. They sent him to study at the castle of King Philip II, a close family friend.

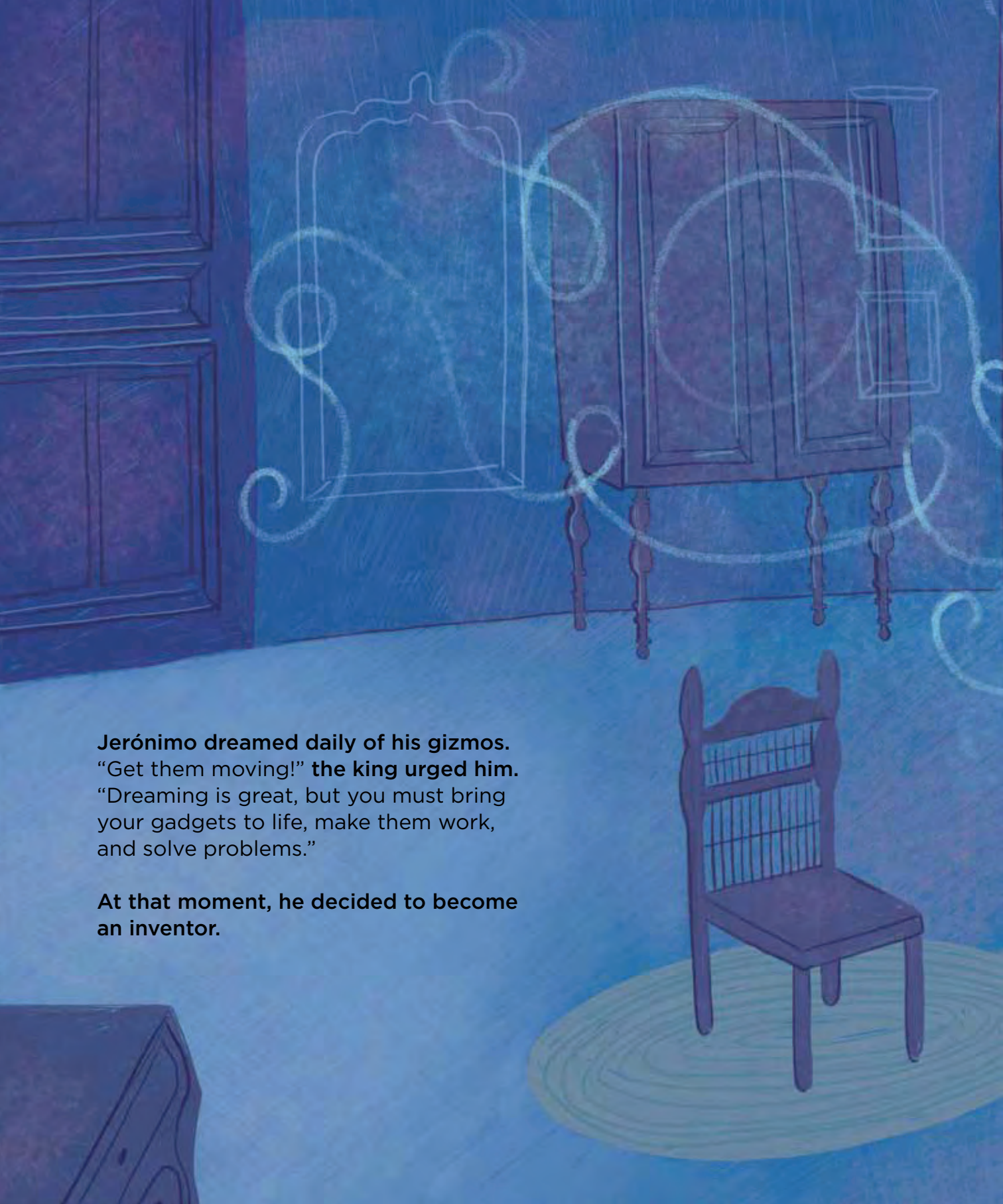




Philip II was really keen on people with clever ideas. They hit it off right away.

At court, he learned to mix impossible things: poetry with mathematics, music with chemistry, physics with combat sports... and this practice made him invincible.

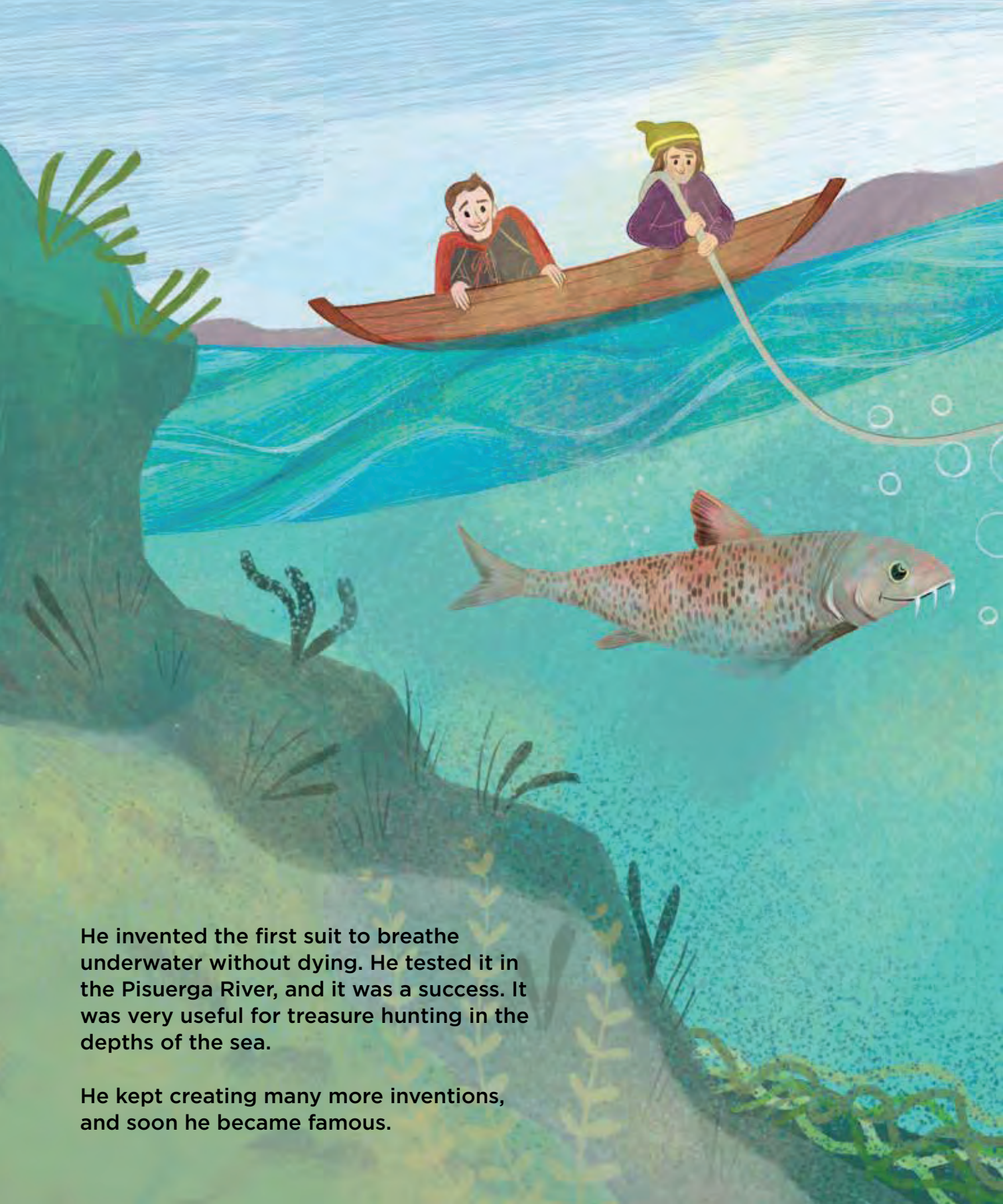




Jerónimo dreamed daily of his gizmos.
“Get them moving!” the king urged him.
“Dreaming is great, but you must bring
your gadgets to life, make them work,
and solve problems.”

**At that moment, he decided to become
an inventor.**





He invented the first suit to breathe underwater without dying. He tested it in the Pisuerga River, and it was a success. It was very useful for treasure hunting in the depths of the sea.

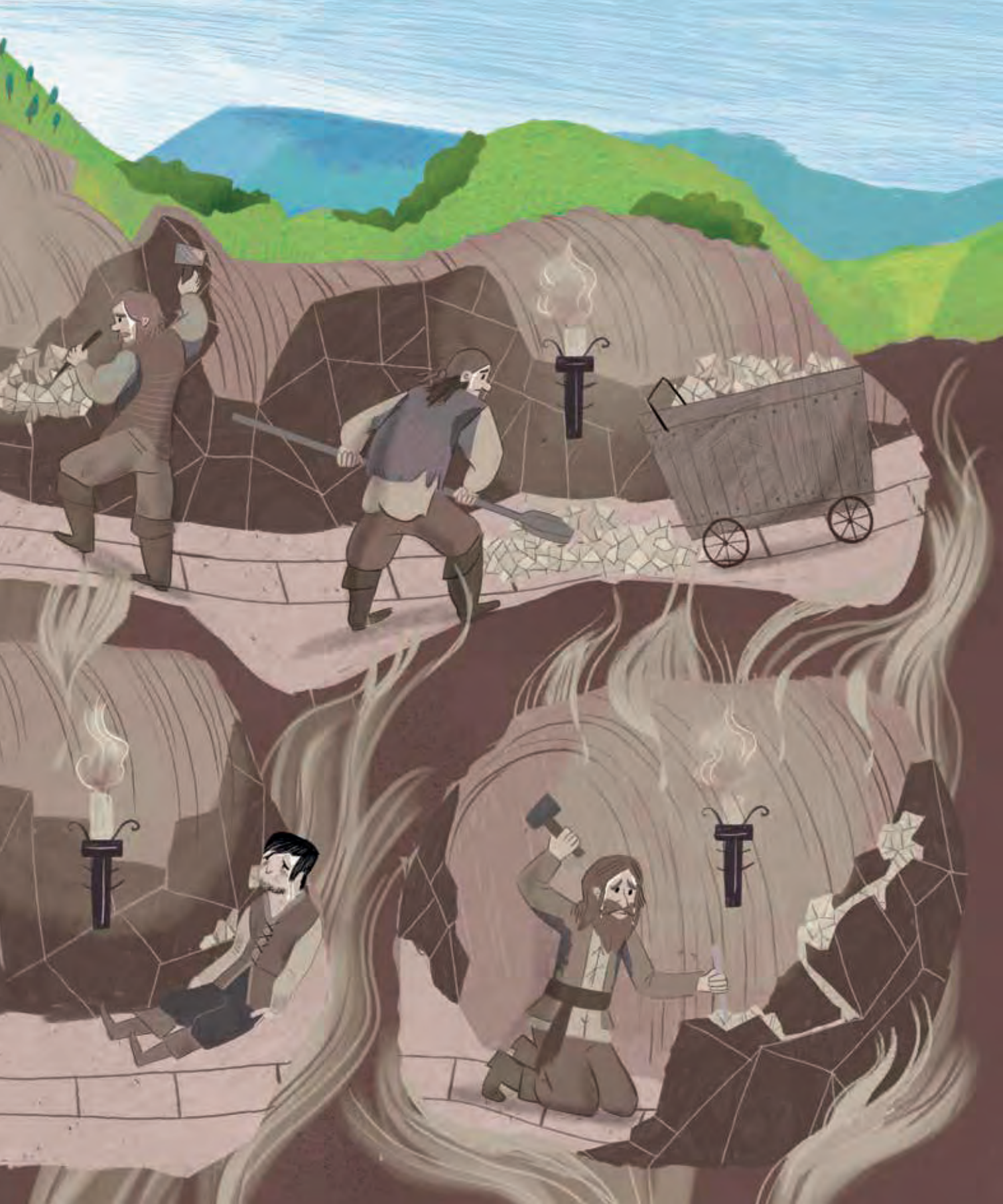
He kept creating many more inventions, and soon he became famous.





One day, they called him to help some miners. They were working in the mines — deep, dark holes beneath the rocks of the mountains. Inside, there was gold, silver, and other valuable metals.

People would get sick when they went in. It was so hot that it felt like you were roasting in an oven.

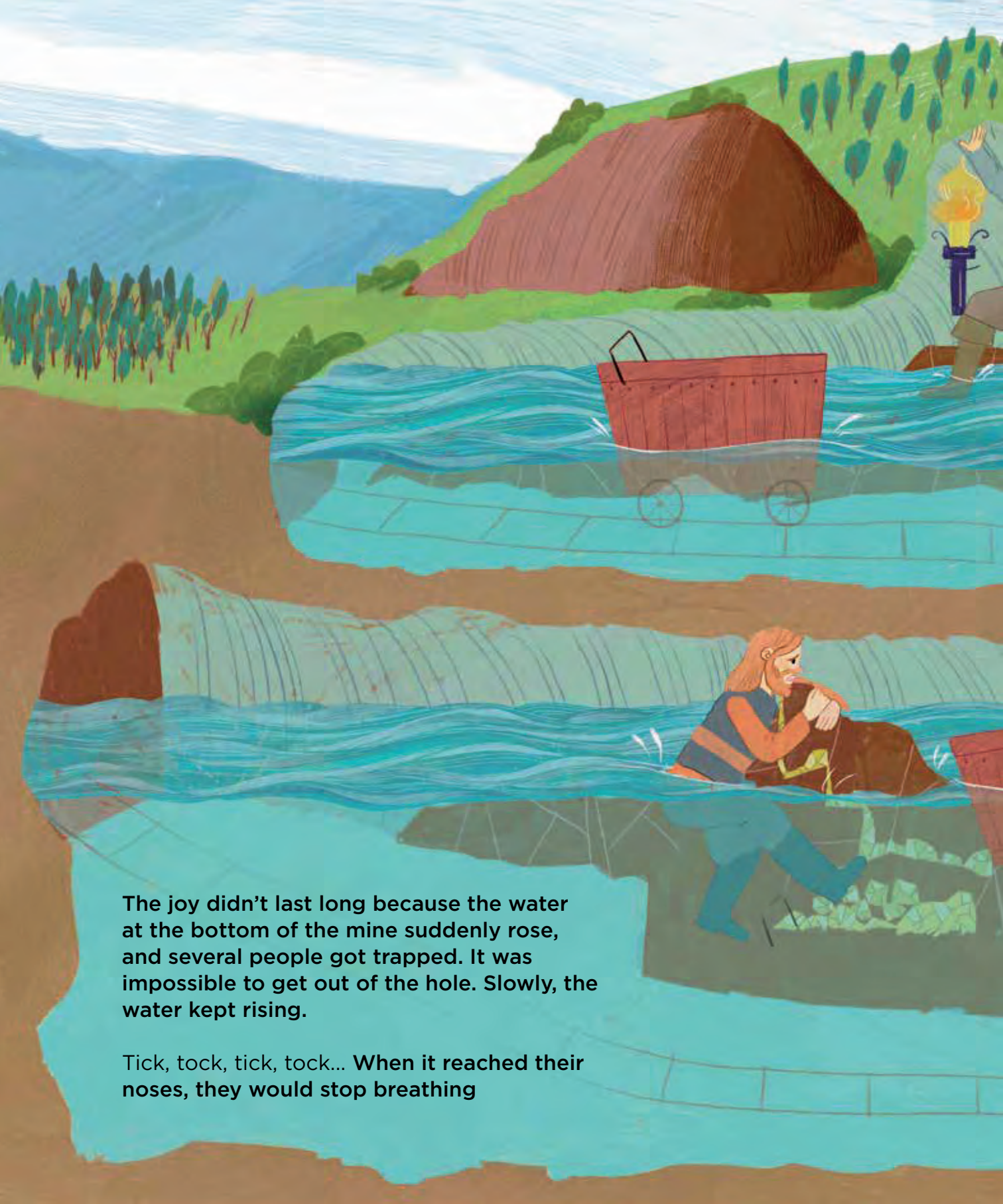




Jerónimo got down to work and invented... air conditioning!

He connected the mine to the forest through some tubes. With a rather strange gadget, he managed to make the outside fresh air reach every last corner.

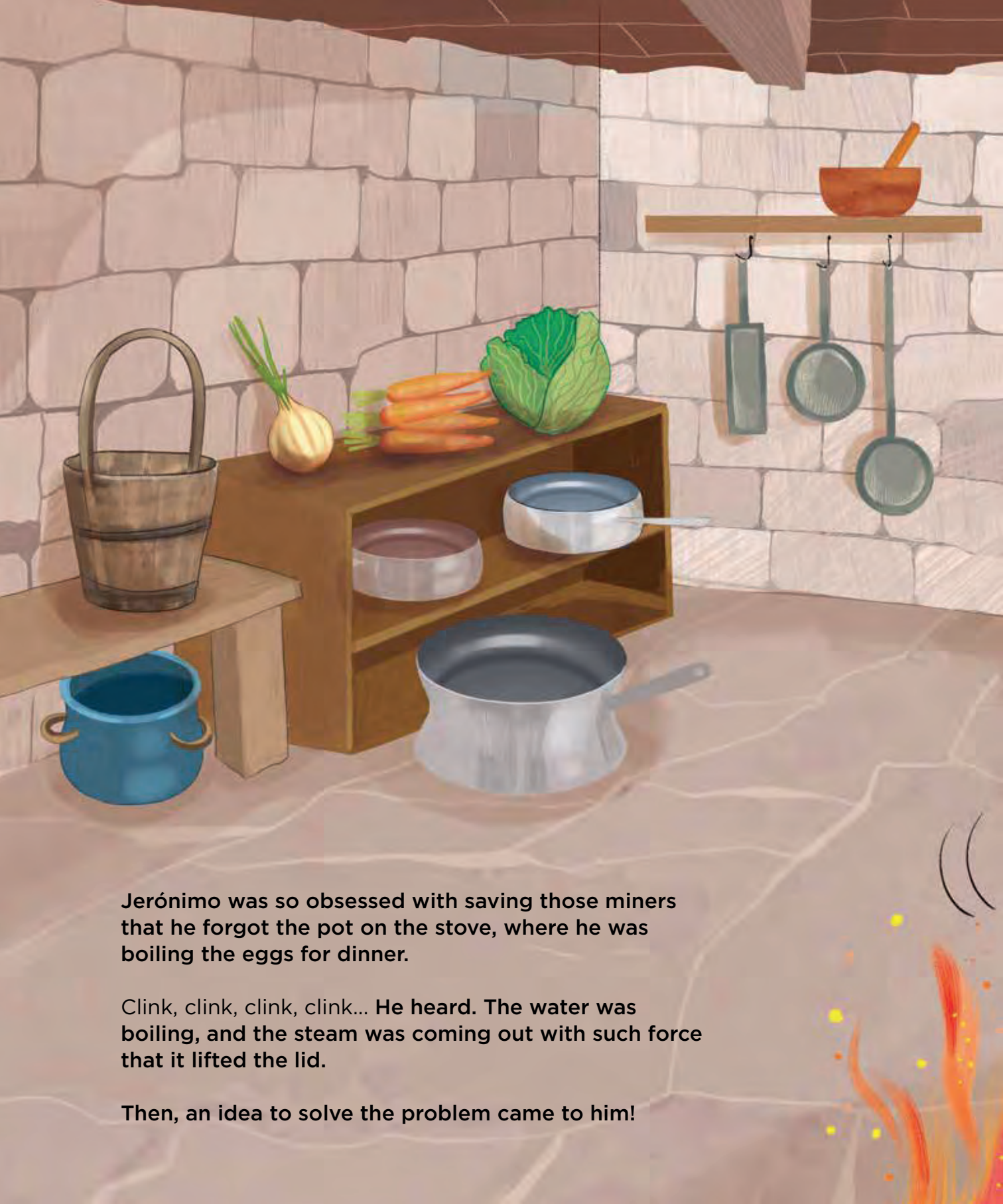




The joy didn't last long because the water at the bottom of the mine suddenly rose, and several people got trapped. It was impossible to get out of the hole. Slowly, the water kept rising.

Tick, tock, tick, tock... When it reached their noses, they would stop breathing





Jerónimo was so obsessed with saving those miners that he forgot the pot on the stove, where he was boiling the eggs for dinner.

Clink, clink, clink, clink... He heard. The water was boiling, and the steam was coming out with such force that it lifted the lid.

Then, an idea to solve the problem came to him!





He invented a machine that could pump the water out of the mine through the air conditioning pipes, using the power of steam.

From that day on, all the miners could live with less fear, thanks to him!



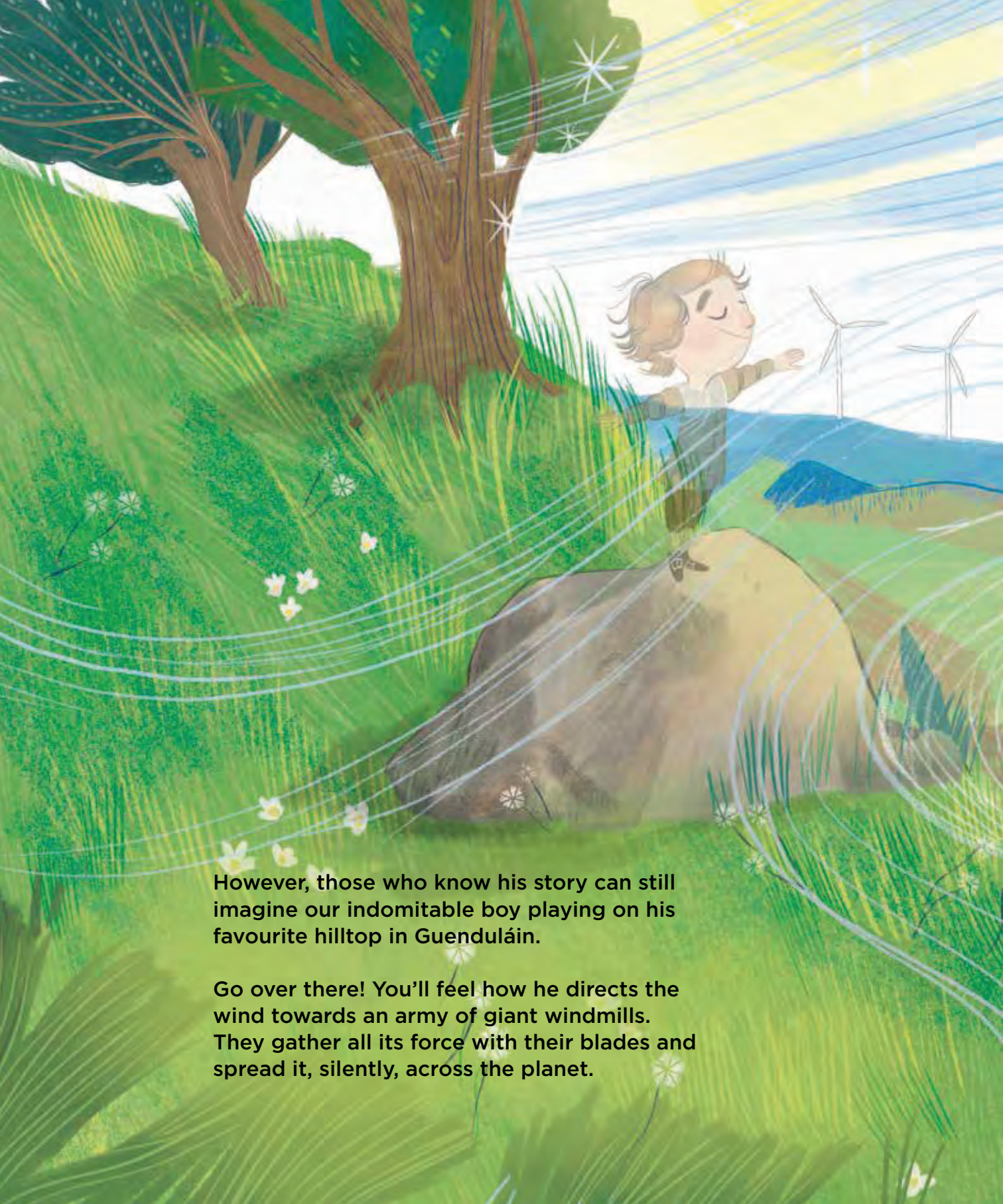


Many scientists say that, since he lived so long ago, we have forgotten about Jerónimo de Ayaz and his machine.

It turns out that, after him, a man named James Watt made a similar steam engine popular and started a revolution that changed the world.

Now it's Watt who appears in the books.





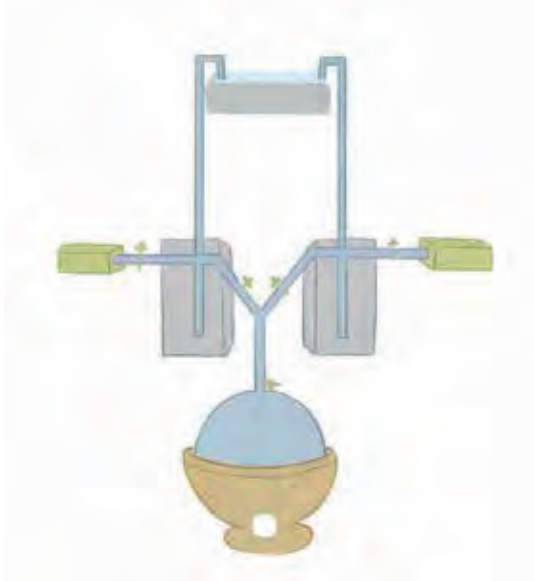
However, those who know his story can still imagine our indomitable boy playing on his favourite hilltop in Guenduláin.

Go over there! You'll feel how he directs the wind towards an army of giant windmills. They gather all its force with their blades and spread it, silently, across the planet.



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INVENTIONS OF JERÓNIMO DE AYANZ



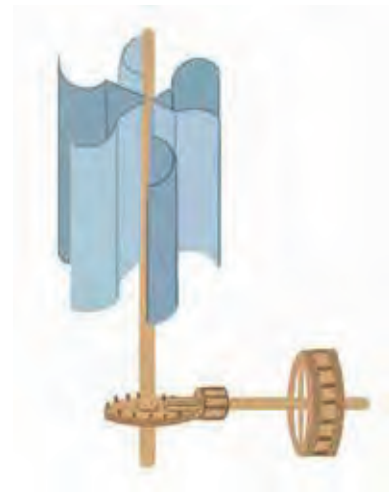
Steam Engine



Water Intake System



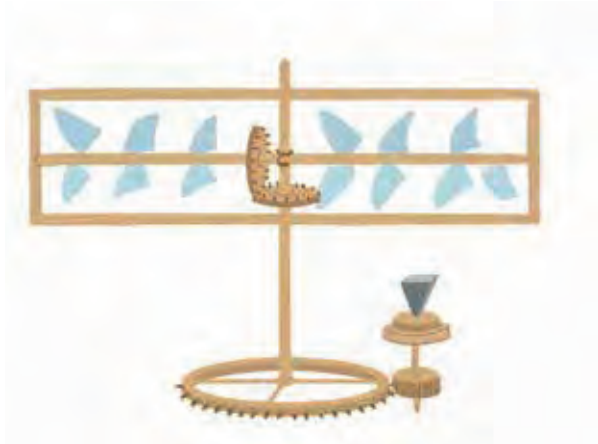
Diver suit



Vertical Axis
Windmill



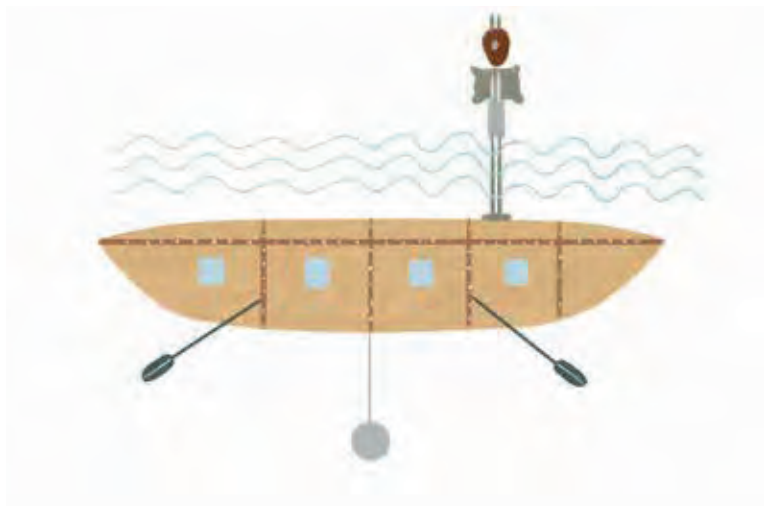
Scientific Precision Scale



Windmill with Screw
Blades



Furnaces



Submarine

HISTORICAL CONTEXT

Jerónimo de Ayanz y Beaumont was born into a noble family from Navarra, which, through both his paternal and maternal lines, had played a prominent role during the crises and conflicts of the 15th and early 16th centuries. His services to the crown had been aligned from the beginning with the Beaumont faction, which, initially linked to the **Prince of Viana**, eventually became the key element of the interests of **Ferdinand the Catholic**. This context helps to better understand the prestige of the lineage and the closeness to the crown that was later extended through Jerónimo de Ayanz's parents and grandparents, not only in the service of **Charles V**, but also later in the service of **Philip II**, and ultimately of **Philip III**.

Born most likely in 1553 at the Guenduláin palace, his father's estate, he and his older brother were able to take advantage of one of the most interesting educational opportunities of their time at the Page School of Philip II's court in Madrid, where royal infants and court elites also studied.

The king, whose monarchy had reached its maximum expansion and political splendour, **was a great promoter of science and technology, with a special concern, within the context of Humanism, for practical knowledge, applied to the resolution of problems.**

The School offered a unique opportunity to begin a professional career in the service of the **Habsburgs**, especially appealing to someone who would not inherit the family estate, as it would go to his elder brother. Ayanz spent four years undergoing thorough intellectual and technical training. Alongside various Liberal Arts, special emphasis was placed on Mathematics and the Sciences.

His strategic mind and legendary physical strength paved the way for a **successful military career** in Flanders, Italy, and Portugal. This brought him various benefits and royal honors, securing his livelihood.

Jerónimo de Ayanz applied his exceptional training innovatively throughout his career, becoming **the first Spanish general administrator of the kingdom's mines**. He was deeply involved, both personally and professionally, in mining operations, demonstrating an **undeniable talent for technical innovation and inventiveness**, which we now understand with greater precision.

Eloísa Ramírez Vaquero

Professor of Medieval History

TECHNICAL BIOGRAPHY

Jerónimo de Ayanz y Beaumont (Guenduláin - Navarre 1553-1613) was an **inventor whose vision and ingenuity positioned him as a pioneer in Golden Age engineering**. His legacy includes a wide range of innovations that laid the foundations for future technological developments.

During his time as General Administrator of the Kingdom's mines, he supervised more than 550 mining operations in Spain and America, identifying critical problems such as the accumulation of water in the mines, which hindered the extraction of minerals and endangered people's lives.

To tackle this challenge, in 1606, **he designed a steam engine** to pump water from the mines, **anticipating the industrial applications of steam power by more than a century**. Today, in the **General Archive of Simancas** (Valladolid-Spain), there is the first patent of a modern steam engine and he is its inventor.

While inspecting a foundry, a close collaborator, **Florio Soberiano**, died from exposure to toxic fumes, one of the many hazards tied to the mines. Ayanz was also badly injured by this accident. His survival, owed to his remarkable physical strength, only deepened his determination to find solutions.

He developed ventilation systems to improve air quality in underground environments, revealing advanced knowledge of fluid

dynamics. His interest in thermodynamics led him to design cooling instruments that used snow to cool the air, outlining modern concepts of air conditioning.

Ayanz's versatility becomes evident in his contributions to navigation and the underwater world. He designed a diving suit that allowed divers to breathe underwater using a system of tubes and bellows, and successfully demonstrated it before the court of Philip III in 1602. He also designed submarine prototypes equipped with air renewal mechanisms and ballast systems, thus **approaching naval engineering**.

Over the course of his career, **Ayanz registered around 48 patents**, including improvements to windmills, innovations in furnaces for metallurgical processes, and scientific precision scales. His multidisciplinary background and ability to apply scientific principles to practical problems make him a prominent figure in the history of engineering.

Francisco Falcone

Head-Institute of Smart Cities (ISC)
Professor of Signal Theory and Communications

UPCOMING TITLES



ACKNOWLEDGMENTS

To our advocate, for joining us on this adventure.

To Ramón Gonzalo, Rector of the UPNA, for his enthusiastic support and prompt commitment.

To Nicolás García Tapia, for his wonderful book, brimming with inventions, knowledge and passion for Jerónimo de Ayanz.

To Isabel Álvarez, for her thoughtful translations into English.

To the professors who contributed their technical perspectives on our protagonist.

To the adults whose curiosity leads them to open this storybook and share the lives of others with their children.

To the children, for reminding us of what we are.

LOCATIONS

- Guenduláin Palace, Declared a Cultural Heritage Site of Navarra. Cendea de Cizur, (Navarre, Spain).
- Windmills, Sierra del Perdón (1,039m), Way of Saint James (Navarre, Spain).
- Jerónimo de Ayanz Research Center, Arrosadía campus, UPNA (Pamplona, Spain).
- General Archive of Simancas (1540), a castle that houses the patent for Jerónimo de Ayanz's steam engine. (Valladolid, Spain).

BIBLIOGRAFÍA Y FUENTES EN LÍNEA

Libro *Jerónimo de Ayanz y Beaumont, un inventor navarro* - Nicolás García Tapia.

Céntum, *Revista del centenario de la universidad de Murcia, especial Jerónimo de Ayanz*- Alberto Requena Rodríguez, Nicolás García Tapia, Cristóbal Belda Navarro, Juan González Castaño, Nicolás Pascual Vera y Julio Escudero.

Asociación Reinos de España, *Documental Jerónimo de Ayanz* - Director Fran Blanco Argibay, idea original: Pedro Ángel López Barbolla.

Revista Yorokobu, *Jerónimo de Ayanz: el español que inventó la máquina de vapor un siglo antes de la Revolución Industrial* - Mar Abad.

Revista Xataka, *Jerónimo de Ayanz, el Da Vinci olvidado que diseñó un submarino y sistemas de aire acondicionado en la España de los Austrias* - Carlos Prego.





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This collection is inspired by the lives of inspirational people who had the curiosity to explore deeply, the ingenuity to uncover treasures in everyday life, and the courage to promote critical thinking.

"I have always thought of Jerónimo de Ayanz as an engineer ahead of his time, whose genius remained in the shadows because he did not find the necessary support to transcend. We publish this story with the hope that his legacy will take its rightful place."

Carlos Llonis
TW Group President

