WOJCIECH PASZYŃSKI

REMARKABLE POLES

PIONEERS
INVENTORS
EXPLORERS

BOSZ

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INVENTORS
EXPLORERS

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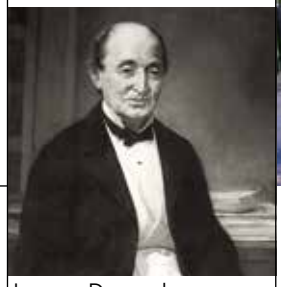

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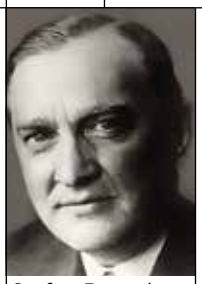

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INTRODUCTION

The scientific, medical, technical, and military contribution to world civilisation made up of the achievements of Poles is in all respects a topic worthy of examination and popularisation. The global impact of these successes might come as a surprise for some readers, especially considering the relatively modest level of public awareness about them.

The fates of the protagonists of this book have been quite diverse. Among them are monarchs and aristocrats, townspeople and settlers, the well-to-do and those whose wealth was mainly in spirit. Enlightened minds, full of grand ideas, trailblazers, valiant hearts, virtuosos of the sword and pen. Scientists and men of letters, travellers and explorers, inventors and pioneers, conquerors, statesmen, and military leaders. Some names are universally known, while others have been burnished with a noble patina of time. What is it that binds together all these characters? All of them were born in Poland, the land that stretches out on either side of the banks of the Vistula River, and in all of their veins flowed Polish blood.

There is one more thing, however, that they all have in common – the fact that they all planted a seed which transformed the reality which they were born into, bringing knowledge and hope for a better tomorrow to people all around the world. These titans from the banks of the Vistula fearlessly set out on brave new paths where others saw only the murky horizon of the daily grind. The milestones along these paths of Polish ingenuity not infrequently conceal mysteries of the lives and actions of those who laid them. I invite you, Dear Reader, to discover their stories.

1

THE WHEEL

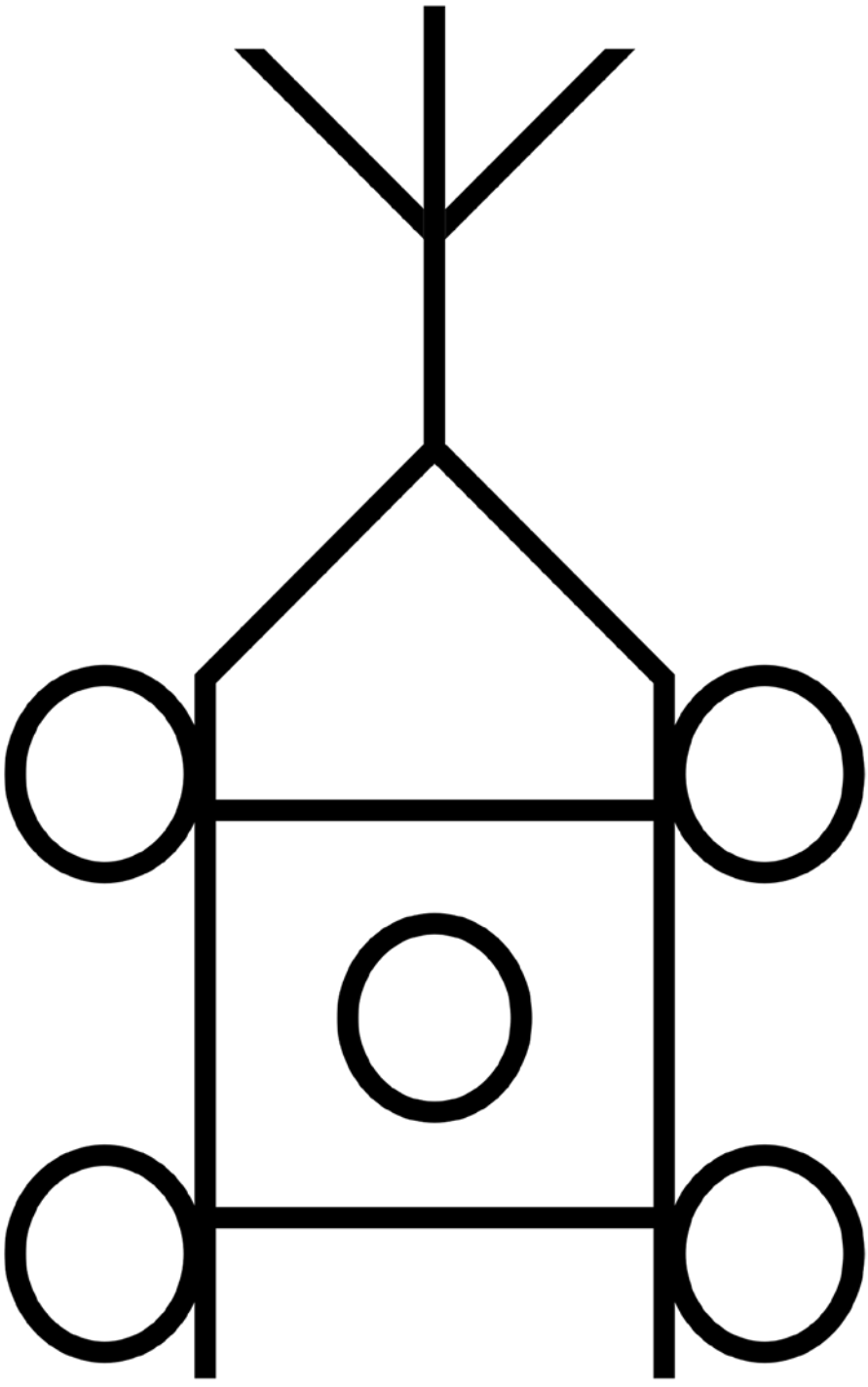
HOW THE ANCIENT INHABITANTS OF THE LAND ALONG THE VISTULA SET THE WORLD IN MOTION

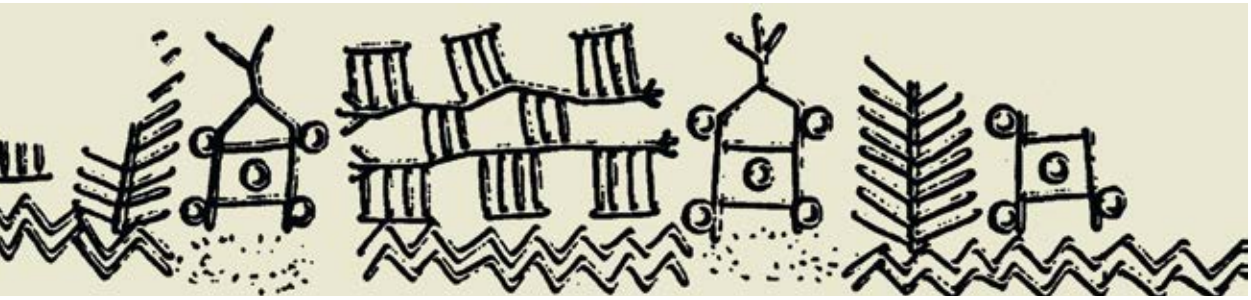
THE EUROPE OF 5,000 YEARS AGO (circa 3,000 BCE) is not generally thought of as being the cradle of civilisation, and rightly so. Writing was still unknown, there was no caste of public servants or priests, administration was primitive, as were public works and hierarchical tributary relations, no consolidated state entities emerged. Yet it was precisely in this period of primaeval forests and wilderness that what was perhaps one of the greatest revolutions in the history of the world occurred.

Agriculture and animal husbandry were already known in the Polish lands at that time, clearings were being cut in the forests, there was a quite well-developed system of tribal organisation, and clan solidarity provided an ersatz legal system, while tribal elders played the role of an aristocracy. Clever and ingenious solutions were used to overcome the multitude of adversities of fate: the harsh climate, feuds between tribes, the struggle to obtain and store adequate amounts of food. The germ of a future civilisation was being sown. The people of that time had learned how to acquire salt, which was used as an addition to the daily diet and to preserve foodstuffs. The development of mining technologies and metallurgy had allowed for the smelting of ores and the forging of tools for daily use, weapons, and copper ornaments. The barter system had almost certainly been replaced by a kind of proto-currency, for example in the form of animal pelts.

p. 9
Object in the form of a ceramic pot, decorated with incised ornamentation depicting a four-wheeled wagon

Reproduction of the depiction of the four-wheeled wagon from the Bronocice pot





Reproduction of the incised ornamentation from the Bronocice pot

Among these inventions, one quite exceptional technology in particular had been developed. It can be ranked alongside such achievements as the taming of fire, the domestication of plants and animals, the invention of the steam engine or the internal combustion engine, or the mastery of atomic energy. And what was this invention?

Mysterious traces of it were discovered in the area of what is now southern Poland. Bronocice is a village in the Małopolska province, situated in the Miechów highlands about 50 kilometres north of what later would become the city of Kraków. In those mist-shrouded ancient times, there were settlements here belonging to the Lublin-Volhynian culture, the Funnelbeaker culture, as well as groups of the Baden culture with syncretic features. The more than 50 hectare site was the object of archeological excavations in the late 1970s. One of the most spectacular discoveries made at the time in the region was a pot depicting a four-wheeled wagon.

This discovery, known in academic literature as the "pot with wagons", is dated to roughly 3520 BCE. Some researchers have even suggested that it may date back as far as 3650 BCE[1]. It is the oldest evidence of the use of wheeled vehicles in the world. It predates by a thousand years the raising of the Great Pyramid of Giza, and by 500 years the establishment of the first city states in Mesopotamia, Egypt, and India. The Bronocice pot is a medium-sized object and displays features characteristic for

[1] According to radiocarbon dating. Estimates following the work of: Sarunas Milisauskas, Janusz Kruk, Richard Ford, Maria Lityńska-Zając, Zofia Tomczyńska, *Neolithic Forest Composition as Reflected by Charcoal Analysis from Bronocice, Poland*, "Sprawozdania Archeologiczne" 2004, vol. 56, pp. 271–288.

the Funnelbeaker culture (ca. 4200–2800 BCE). In the upper part of the pot there are curious decorations depicting a schematic representation of five four-wheeled wagons, as well as trees (or woods) and houses (or fields) with roads. The entire figurative decoration is encircled below by a river. The images seem to create a kind of narrative sequence. The ancient artist must have inscribed here information on events related to the daily life of the inhabitants of the local community. In terms of European archeology, this was an exceptional and completely unprecedented discovery.

The vehicles depicted on the pot do not depict a source of power, neither horse nor ox, yet they are fitted with a double yoke, suggesting that it was customary to yoke a pair of animals to the wagon, not just one. Between the wagons an additional fifth wheel has been indicated, which may be meant to portray a driver (or passenger?) or a spare wheel. These are not, however, the only interpretations of the additional disk; some are inclined to associate it even with a solar cult, similarly to the chariot of the Greek god Helios.

The discovery of the Bronocice pot overturned a thesis on the technological and civilisational backwardness of the lands along the Vistula in ancient times, a belief which is still commonly held today. The invention of the wheel after all constituted a milestone in human history, one which opened the door to countless other inventions, not least of which are the geared wheels of factories or the mechanisms of clocks. It was the beginning of a great revolution in transport, communication, arms, trade, and agriculture. Wagons and war chariots, carriages and coaches, buggies and cabs, locomotives, trains, motor cars, trolleybuses, buses, agricultural and construction machinery, and even planes would not have been possible if not for this technological miracle which took place in the lands of future Poland.

XIV

MATTER

WOVEN FROM DREAMS. THE MAJESTY OF POLISH ENGINEERING

THE ACHIEVEMENTS OF POLES IN THE FIELDS OF ENGINEERING AND CONSTRUCTION cover a wide range of inventions; from mechanical clocks to bridges and modern transport infrastructure. These inventions helped facilitate the advances in human life of the early period of technological civilisation.

During the era of steam engines, when railways lines began to encircle the Earth, nearly every step forward represented a small technological revolution. One of these revolutions was in the form of a "tax machine" (1849), which made railways journeys easier. The inventor, Jan Baranowski (1805–1888), also constructed a machine for printing and checking tickets (1851), and an innovative automated system for railway signalling which was used both in French and British railways (1858).

p. 153
Benjamin Franklin Bridge in Philadelphia, constructed by Rudolf Modrzejewski

Kierbedzia Bridge, officially known as Aleksandryjski Bridge, 1860s

Another engineering and construction pioneer was Stanisław Kierbedź (1810–1899), who was the first in the world to build iron truss bridges. He was a forerunner in the use of caissons to set bridge pylons in. He was the constructor of the Aleksandrowski Bridge in Warsaw, later renamed Kierbedź Bridge in his honour. This Polish engineer constructed the bridge between 1859 and 1864. Currently, this bridge exists as the Silesian-Dąbrowa Bridge, and its pylons, despite wartime damage, are still the originals.

Another construction with the intricacy of a Swiss watch – literally speaking – we owe to Antoni Patek (1812–1877). This Polish watchmaker


6
BRODNO

went down in history as a pioneer of commercial watch manufacturing. When the violent clashes of the November Uprising had settled down, Patek left Poland, the land of his ancestors, to make his way to Switzerland (1833). In Geneva, he established a watchmaking manufactory (1839), which gradually became more and more influential. In collaboration with the French watchmaker Adrien Philippe, Patek built a company manufacturing luxury watches (1845) which has been in uninterrupted operation since that time. In short order, the business dominated the global watch market. Proof of the high quality of these magnificent examples of the watchmaker's art are the numerous gold medals won at world expos over the years. Patek Philippe remains today one of the most prestigious and most expensive watch brands in the world.

A Polish constructor from the numerous ranks of Poles who have been awarded British titles of nobility was Sir Kazimierz Gzowski (1813–1898), who served the British Crown by building Canadian railway infrastructure in the North American part of the Empire. From 1842, this unquestioned pioneer in the construction of railways also designed roads, bridges, and harbours. One of his most well-known designs is the International Bridge

p. 156–157
Kierbedzia Bridge connecting Warsaw with the Praga district, 1934

Display cabinet with elements of a watch mechanism, gift of Antoni Patek to the Museum of science and Industry in Kraków

Patek et Cie Geneve watches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Patek i Spółka
W GENEWIE

across the Niagara River near Buffalo (1873). In the years 1896–1897, he was entrusted with the governing of the province of Ontario. It was in recognition of these services that he was knighted in 1890.

The inventor and engineer Henryk Machalski (1835–1919) also found success in the field of railways. One of the most well-known examples of his ingenuity in this area is the powered carbon microphone, for which he was awarded a patent in 1879. Two years later, he amazed the public by playing in Lviv a transmission of a concert taking place in Żółkiew. Machalski's telephones were next installed along the Lviv-Chernivtsi railway line, significantly improving communications.

The Polish engineer Feliks Jasiński (1856–1899) made great contributions to the development of railways in the Slavic lands, building a line which linked the two most important Russian cities, St. Petersburg and Moscow. This Pole also constructed bridges and made pioneering contributions to elasticity theory.

Rudolf Modrzejewski (1861–1940) won fame overseas as an outstanding constructor of suspension bridges. Going by the name Ralph Modjeski during his stay in the United States, he was the son of Helena Modrzejewska (1840–1909), who was, apart from the later Pola Negri (ca. 1896–1987), the most famous Polish actress in the USA. He lived in the USA from 1876 onwards, where he developed his talents as a constructor of bridges. In 1893, he established an engineering company in Chicago which has operated under the name Modjeski & Masters since 1924. He constructed his first important commission in 1896, an enormous two-level bridge stretching from bank to bank of the Mississippi River and connecting the towns of Davenport in the state of Iowa to Rock Island in the state of Illinois. This impressive construction was used for both automotive and railway transport. A fine example of his ingenuity in engineering and of his fame is the bridge over the Mississippi in the town of Thebes in Illinois, which is over 850 metres long. At the time, the American press considered him to be the world's most outstanding constructor of bridges (1903). Subsequent projects further established his international fame, including the Modrzejewski Harahan Bridge (1916) in Memphis.

Engineer Rudolf Modrzejewski (1861–1940), pioneer of suspension bridges

Rudolf Modrzejewski made his name as a pioneer in the construction of large-scale suspension bridges. A well-known example of this type of con-

struction is the Benjamin Franklin Bridge in Philadelphia, completed in 1926. It was the first of a type of suspension bridge that is common today, examples of which can be seen around the world. His crowning achievement was the Huey P. Long Bridge over the Mississippi near New Orleans. This cantilevered construction was at the time a symbol of the apex of the technical possibilities of the science of bridge-building. This upper limit was set by Modrzejewski and many decades passed before anyone was able to exceed it.

Over the course of his long professional career, this remarkable Pole built more than 30 bridges spanning the most important rivers in the United States. He was one of the greatest innovators in the history of bridge building; he not only introduced new technical solutions and materials (such as steel and reinforced concrete) which is still widely used today, but also trained numerous worthy successors. Of these, the most remarkable was Joseph Strauss, who constructed one of the most iconic bridges in the USA – the Golden Gate Bridge in San Francisco. Modrzejewski enjoyed international fame, winning many awards and honours for his work.

A Polish master in the field of architecture was Władysław Horodecki (1863–1930), a practitioner of Late Historicism and of Modernism. His activities were mainly centred on Kiev, where he designed many impressive buildings. Among the most well-known of these are the Museum of Art and Antiquity, currently the National Art Museum of Ukraine (1897–1899), the building of the "Rossija" Insurance Agency, and his own home, known as the House with Chimaeras. He also carried out his architectural projects in Crimea and the Caucasus, as well as in Tehran, where he ultimately passed away. He designed the mausoleum of the noble Potocki family in Pechera (1904) in the Podolia region, and the palace in Tulin (1904). Because many of the façades of buildings he designed incorporate elements of fantasy, Horodecki is sometimes compared to the Catalan architect Antoni Gaudí.

Few remember today that the first president of the reborn state of Poland also made significant contributions in the field of engineering. Gabriel Narutowicz (1865–1922) was involved in hydraulic engineering and constructed many hydroelectric facilities in the West. He was a lecturer at the

Zurich Polytechnic (1908), and before becoming president in the newly independent Poland, he was, among other things, the Minister of Public Works (1920–1921).

Another outstanding engineer, this time in the field of transportation, was Władysław Tryliński (1878–1956). The total length of roads which he constructed would certainly exceed the borders of Poland many times over. He introduced numerous innovations in the construction of road surfaces. He also designed railways, bridges, and river course management systems (the Pripyat and the Niemen). Along with Rudolf Modrzejewski, he became a pioneer and populariser of the use of reinforced concrete structures. And in addition to asphalt and clinker bricks, he also introduced his own technical solutions, including special hexagonal concrete blocks called trylinki (patent no. 18323 of 1935), which have been used around the world. Working from a design by Stefan Bryła, he built the first welded road bridge in Europe over the Słudwia River near Łowicz (1929). Władysław Tryliński, author of many patents and technical innovations, made a significant mark in the history of Polish and world civil engineering.

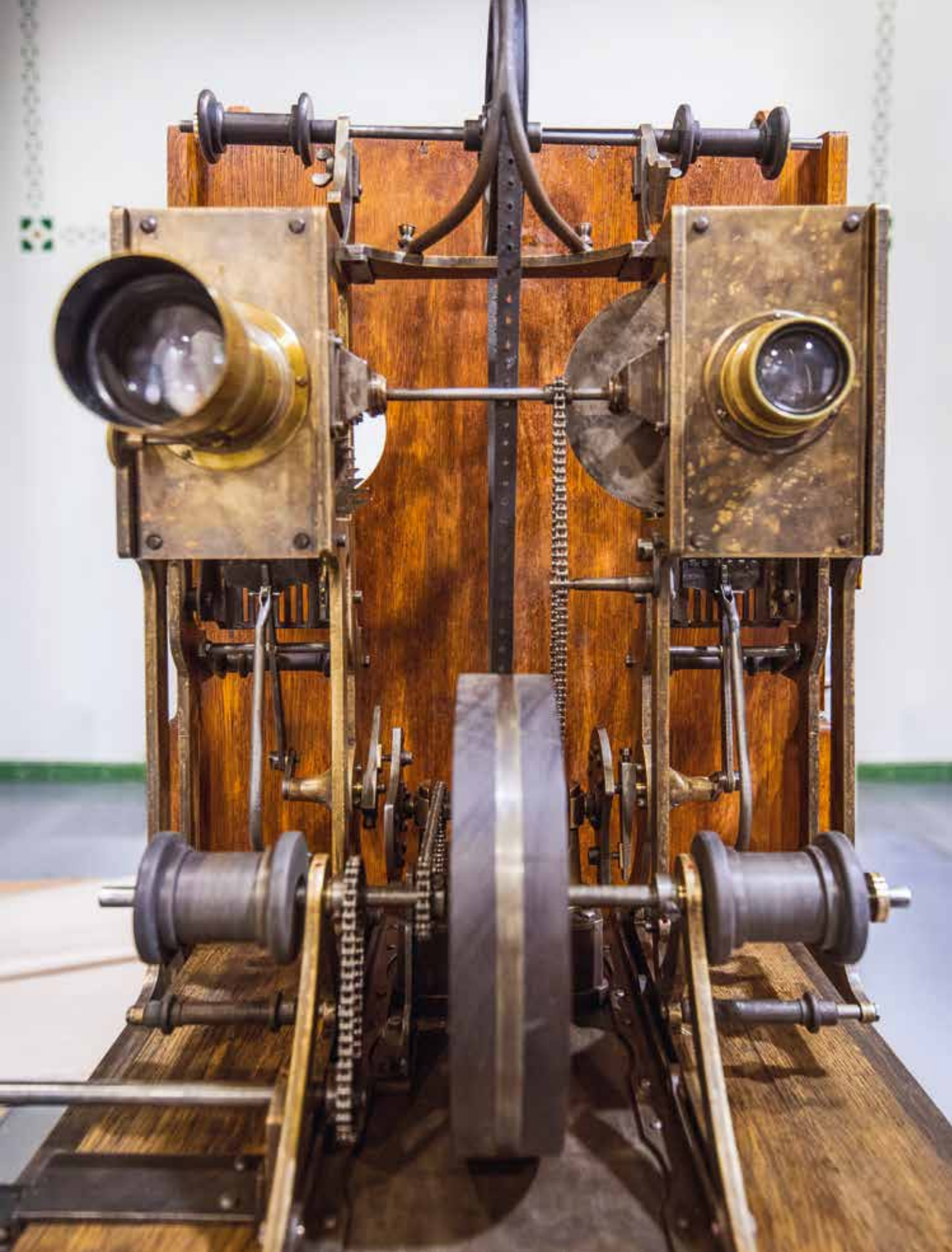
This list of names hardly exhausts the list of Poles who have made a contribution to the theory and practice of engineering. The beauty and panache of the impressive and often ground-breaking constructions which they left behind can still be admired today, far beyond the borders of Poland.

House with Chimaeras designed by Władysław Horodecki, known as the Polish Gaudí

XXX

THE PLEOGRAPH

THE BIRTH OF WORLD CINEMATOGRAPHY

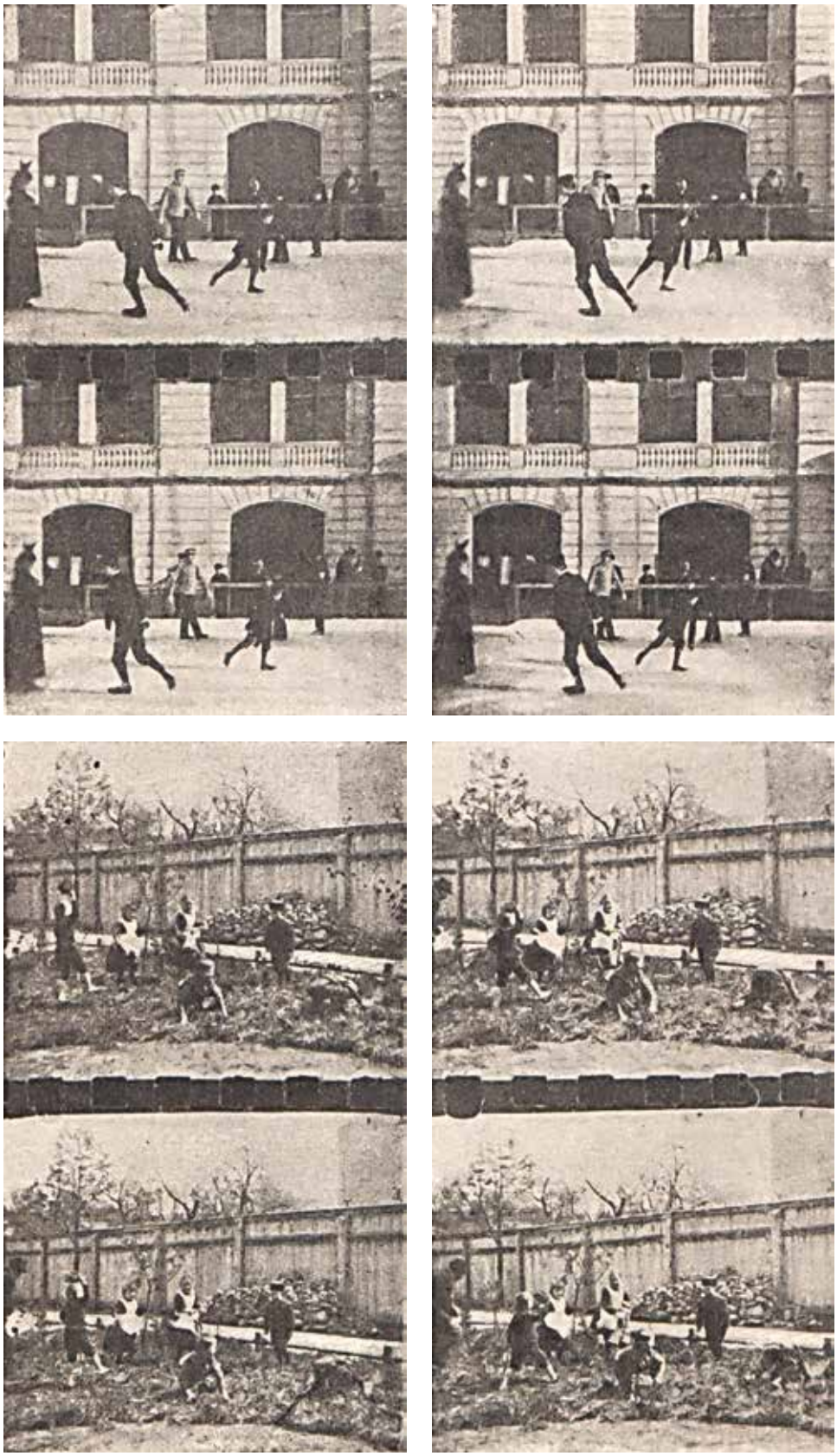


IS CUSTOMARY TO CONSIDER France (the Lumière brothers), or possibly the United States (Edison), as the birthplace of cinema. Yet surprisingly, the beginnings of the tenth muse can be sought out to the east of the Rhine, the Elbe, or even the Oder – in the land along the banks of the Vistula River.

One of the first types of "kinematograph", or device for recording moving pictures, was the Polish pleograph, invented by Kazimierz Prószyński (1875–1945). This device far surpassed the primitive and clumsy Kinetoscope created by the workshop of Thomas Edison (patent from 1891). Prószyński developed his device between the years 1894–1895, earlier than the Lumières in France, and this global pioneer of cinematography was already putting his device to use in 1895. It played two roles, both for recording and projecting motion pictures. Prószyński's revolutionary camera overcame the problem of the jerking motion of the film through the projector, considerably improving its operation. In the version he developed in 1896, he eliminated the shaking of the image that was characteristic of the early age of cinema. His greatest success was the biopleograph from 1899. In 1895, Prószyński himself recorded the first Polish films, some of the earliest in the world.

Riding the wave of public interest in this state-of-the-art invention, Prószyński set up the Pleograph Stock Company, which made several pio-

p. 287
Kazimierz Prószyński's Biopleograph (1899), the distant ancestor of the modern motion picture camera



Frames from the short film *Skating at Łazienki Park* by Kazimierz Prószyński, one of the oldest films in the world (ca. 1894)

neering films in the years 1902–1903. Among these classics are the short-form films *Franciszkańska Street*, *At the Mickiewicz Monument in Warsaw*, *Skating at Łazienki Park* and the famed *Return of the Pleasure Seeker* (with Kazimierz Junosza-Stępowski in the title role). This last marks the beginnings of Polish cinematography. It was lost over time but has been "reconstructed" recently at the initiative of the National Centre for Film Culture in Łódź (dir. Piotr Szczepański, 2018). The titular "pleasure seeker" was played by an actor of the new generation, Jakub Gierszał (born 1988). The film was recorded using a special biopleograph, reconstructed according to the design of Prószyński.

After the success of his invention, the Polish innovator left for France (1908), where he won the esteem of the *Académie des sciences* in Paris. His ground-breaking design solutions were even adopted by another pioneer of cinematography, Léon Gaumont, founder of one of the oldest film studios in the world. The Pole also invented a device allowing for the full synchronisation of sound and image, which he called the kinophone (1907). In 1913, he recorded one of the first "soundies" in the history of cinema in London. Prószyński thus became one of the driving forces of developing sound in cinema, which for technical reasons only became widespread in the 1930s.

Prószyński's aeroscope was his second ground-breaking invention. The name comes from two Greek words: *aḗr* meaning "air" and *skopéō* meaning "to look". This was the first handheld motion picture camera in the world (1910), allowing for scenes to be recorded with some stability, achieved with the use of a gyroscope installed in the camera. This innovation meant that films could now be recorded without the use of a tripod. Just as in the case of the previous invention, the camera also played the role of projector. This entirely new development made the first wartime aerial films possible (1917). In 1920, Wilfred Theodore Blake documented his flight around the world. The invention received the gold medal at the first International Cinematograph Exhibition in London (1913). Aiming to meet the needs of amateur filmmakers, in 1912 Prószyński created the "Oko" cine camera and projector. In the mid-1930s, this projector was adopted for official use in the Polish educational system and mass produced "[...] so

that Warsaw will be able to produce so many cameras that it will become the centre of this branch in Europe"[1], as this great inventor and patriot stated in his ambitious plans.

Prószyński's achievements are not the end of Polish contributions in this field. A major contribution to the development of cinema's predecessor, photography, was made in the 19th century by the engineer Władysław Małachowski (1837–1900), a giant of the photographic industry, who, after the failure of the January Uprising, lived in Great Britain (1870). There he began work as an inventor, blazing new trails in the technology of photography. His greatest success was the introduction of rolled film paper, for which he constructed a special "roll-cassette". Among the many patents obtained by this Pole were the optical light meter, called an actinometer (1879), and a device for standardisation of light-sensitive materials, the sensitometer (1881). He also discovered the properties of tannins in developing photographic materials, a considerable advance in the nascent field of photochemistry. Around the same time, another Pole was active in the field, Konrad Brandel (1838–1920), creator of a camera which was capable of taking "freeze-frame" photos (1884). This Polish innovation allowed for the rise of the new discipline of photojournalism.

Piotr Lebiedziński (1860–1934) also made his mark on the development of photographic technology. As early as 1888, he founded the first Polish plant for producing photographic papers which could be copied in daylight, and in the 1930s he co-founded the Foton factory, which manufactured photographic papers and accessories (1933–1939). He was a designer of still cameras, motion picture cameras, and other photographic accessories. His inventions were crucial for the rise of the tenth muse.

These pioneers in the art and technique of film still await proper recognition. Like a Prometheus of the Vistula, they are patrons of the entire film universe, which took its first baby steps at the end of the 19th century with short silent scenes; they are fathers of the grand world of cinematography.

[1] After: Lucyna Smolińska, *Wielcy znani i nieznani* [*The Great, Known and Unkown*], Warsaw 1988, p. 261.

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REMARKABLE POLES

PIONEERS
INVENTORS
EXPLORERS

The contribution of Poles to the creation of a better tomorrow has been remarkable. Numerous inventions and breakthrough technologies have been developed in the land on the banks of the Vistula river, on many occasions before their appearance in Western Europe. It was the Copernican Revolution (1543), for example, that ushered in the era of modern science, and of all countries in Europe, constitutional order was first introduced in the Polish-Lithuanian Commonwealth (1791).

Poles have discovered unknown lands and conquered the summits of soaring mountains. The technological civilisation of today's world draws on many Polish inventions, such as the telectroscope, a prototype of the television, the pleograph, an early motion picture camera, or monocrystalline solids, crucial in the field of electronics, to name just a few.

Poles have not only contributed to the development of science and technology, but have also helped to defend the borders of Europe, for example against Ottoman invasion (1683) and Bolshevik expansion (1920). Poles have safeguarded the loftiest values and ideals.

Discover their fates, their way of thinking, their achievements, and their contribution to the development of world civilisation.