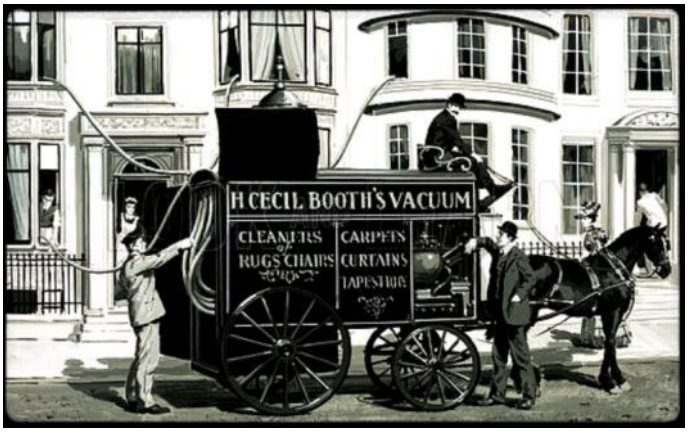
Hubert Booth

Born 1871. Inventor of the vacuum cleaner.
Available online at www.livesretold.co.uk



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1. Introduction

Hubert Cecil Booth.

The following two chapters were archived in 2021, with acknowledgement and thanks, from Wikipedia.

Hubert Cecil Booth (4 July 1871 – 14 January 1955) was an English engineer best known today for having invented one of the first powered vacuum cleaners.

He also designed Ferris wheels, suspension bridges and factories. Later he became Chairman and Managing Director of the British Vacuum Cleaner and Engineering Co.

Booth was born in Gloucester, England in 1871. He was educated at Gloucester College and Gloucester County School under headmaster the Reverend H. Lloyd Brereton. In 1889 he entered the Central Technical College, City and Guild, London after passing the entrance examination. He completed a three-year course in civil engineering and mechanical engineering under Professor William Cawthorne Unwin FRS. He completed the Diploma of Associateship (ACGI), coming second in the engineering department. He became a student of the Institution of Civil Engineers.

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2. Career

In December 1892 he entered the drawing office of Messrs Maudslay Sons & Field, Lambeth, London under Mr Charles Sells, as a civil engineer. In this capacity he designed bridges and large ferris wheels for amusement parks in London, Blackpool, Paris, and Vienna. He also worked on the design of engines for Royal Navy battleships.

Vacuum cleaner

Booth is known for introducing one of the first powered vacuum cleaners. Before Booth introduced his version of the vacuum cleaner, cleaning machines blew or brushed dirt away, instead of sucking it up. As Booth recalled decades later, in 1901 he attended "a demonstration of an American machine by its inventor" at the Empire Music Hall in London. The inventor is not named, but Booth's description of the machine conforms fairly closely to American inventor John S. Thurman's blown air design. Booth watched a demonstration of the device, which blew dust off the chairs, and thought that "...if the system could be reversed, and a filter inserted between the suction apparatus and the outside air, whereby the dust would be retained in a receptacle, the real solution of the hygienic removal of dust would be obtained." He tested the idea by laying a handkerchief on the seat of a restaurant chair, putting his mouth to the handkerchief, and then trying to suck up as much dust as he could onto the handkerchief. Upon seeing the dust and dirt collected on the underside of the handkerchief, he realized the idea could work.

Booth created a large device, driven by an internal combustion engine. Nicknamed the "Puffing Billy", Booth's first petrol-powered, horse-drawn vacuum cleaner relied upon air drawn by a piston pump through a cloth filter. It did not contain any brushes; all the cleaning was done by suction through long tubes with nozzles on the ends.

Although the machine was too bulky to be brought into the building, its principles of operation were essentially the same as the vacuum cleaners of today. He followed this up with an electric-powered model, but both designs were extremely bulky, and had to be transported by horse and carriage. The term "vacuum cleaner" was first used by the company set up to market Booth's invention, in its first issued prospectus of 1901.

Booth initially did not attempt to sell his machine, but rather sold cleaning services. The vans of the British Vacuum Cleaner Company (BVCC) were bright red; uniformed operators would haul hose off the van and route it through the windows of a building to reach all the rooms inside. Booth was harassed by complaints about the noise of his vacuum machines and was even fined for frightening horses. Gaining the royal seal of approval,

Booth's motorized vacuum cleaner was used to clean the carpets of Westminster Abbey prior to Edward VII's coronation in 1901. The device was used by the Royal Navy to improve the level of sanitation in the naval barracks. It was also used in businesses such as theatres and shops, although the device was too large to be feasibly used as a domestic appliance. When cleaning the Royal Mint, upon leaving he was arrested as his machine had collected a massive amount of silver dust from the coins and he had forgotten to empty it. He was however quickly released.

Booth received his first patents on 18 February and 30 August 1901. Booth founded Goblin, his company to sell vacuum cleaning services and refined his invention over the next several decades. Though Goblin lost out to competition from Hoover in the household vacuum market, his company successfully turned its focus to the industrial market, building ever-larger models for factories and warehouses. Booth's company, now BVC, lives on today as a unit of pneumatic tube system maker Quirepace Ltd.

Personal life

In 1903, Booth married Charlotte Mary Pearce, one of the daughters of Francis Tring Pearce, director of the Priday, Metford and Company Limited. He was a friend of Hugh Pembroke Vowles. He was offered a Knighthood, however he turned it down. His father, Abraham Booth, was involved in the development of the transatlantic telephone lines. Booth died on 14 January 1955 in Croydon, England.

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3. Invention of the Vacuum Cleaner

The following two chapters were archived in 2021, with acknowledgement and thanks, from the Science Museum at www.sciencemuseum.org.uk.

In 1901, if you were lucky, you might have witnessed a startling scene on the streets of London—one which would quickly revolutionise how most of us clean our homes. Engineer Hubert Cecil Booth was rolling his new vacuum cleaner onto the wealthier streets of town. First employed by Maudslay, Sons and Field in Lambeth in the 1890s, at the time he was better known for designing suspension bridges and fairground Ferris wheels (including Vienna's famous Riesenrad).

But in 1901 he turned his skill to carpet cleaning after witnessing the demonstration of a new machine at London's Empire Music Hall. He realised that the machine on display had a fatal flaw. It was designed to blow out air in the hope of raising the dust from the carpet and into the collecting bag. The inventor told him that the method Booth suggested instead—sucking up the dirt through a filter—was impossible. Challenge accepted, Booth set off on a mission to produce a machine that would suck, not blow.

Original Booth trolley vacuum cleaner, supplied to the Royal Naval College, Osborne, c.1905. Science Museum Group Collection.

After allegedly near-fatal tests—in which he choked after putting a handkerchief 'filter' over his mouth and sucking up dust from the arm of a chair—Booth formed the British Vacuum Cleaner Company and launched

his new device. This was the huge beast of a machine seen doing the rounds of wealthy Londoners' homes at the start of the 20th century.

The first vacuum cleaner in action

Channelling a red and gold fire engine aesthetic, according to journalist and author Jane Furnival, the distinctive horse-drawn vacuum cleaner and its liveried operators arrived at your house, immediately advertising to the neighbourhood that you were holding a 'vacuum tea party'. A visit wasn’t cheap—the cost was the same as the annual wages of a 'tweeny', a junior domestic maid.

To conduct the miraculous cleaning, long hoses were fed through windows, the petrol-powered motor (and later electric engine) was started and air was drawn by suction from the hose and nozzles through a filter. Locals outside were encouraged to marvel at the amount of dirt and dust collected through a special glass chamber on the side of the machine—another cunning marketing strategy.

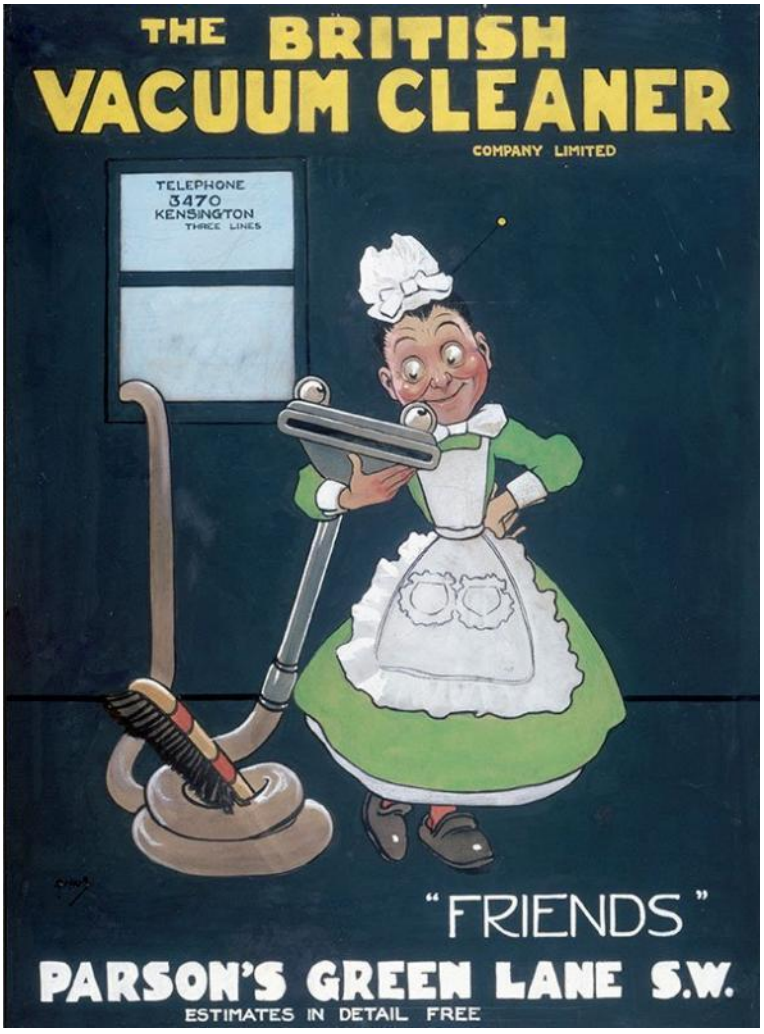
Vacuum cleaning as a luxury

After a flurry of disapproval and a string of court cases, both against the disruption the machine caused on the streets (including frightening horses) and from a series of disgruntled inventors, Booth finally convinced judge and jury that his powerful machine was the only vacuum cleaner at the time that actually worked.

Horse-drawn vacuum cleaner with men standing by, 1903. Science Museum Group Collection.

Cleaning everywhere from Buckingham Palace to the Royal Mint and Crystal Palace—where 26 tons of dust were removed from the girders during a First World War outbreak of spotted fever—its credentials were soon established as a reliable cleaning machine.

The Crystal Palace after its move from Hyde Park to Sydenham.

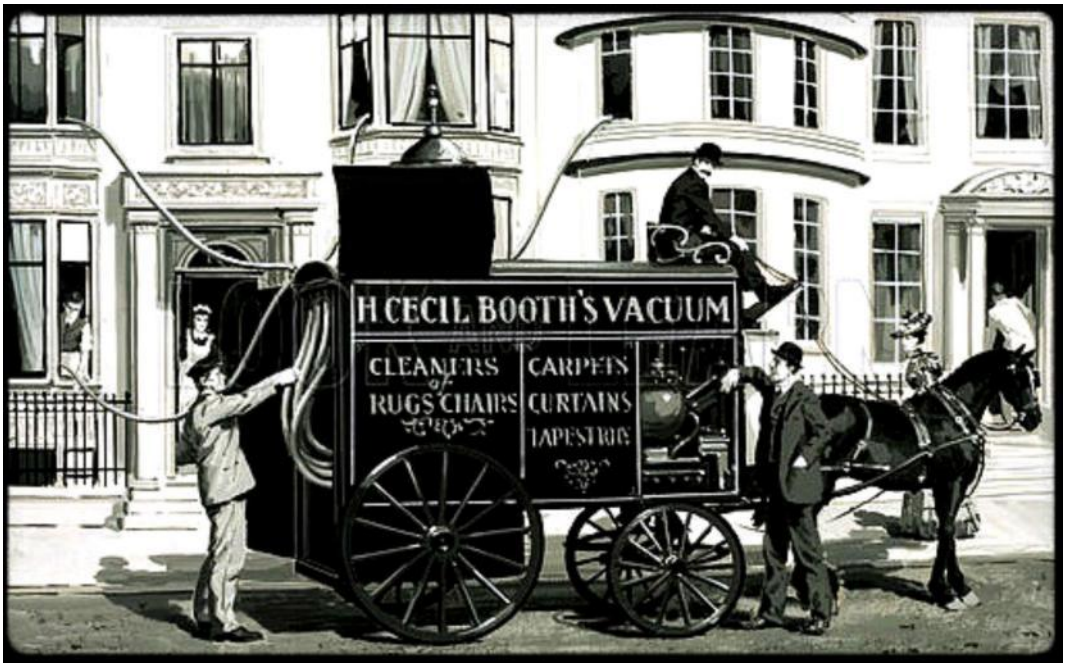


Poster promoting Booth's British Vacuum Cleaning Company Ltd, 1906. Science Museum Group Collection.

Vacuum cleaners were purchased by Russia's Tzar Nicholas II, Germany's Kaiser Wilhelm II, the House of Commons and the popular Dickens & Jones department store in London.

Despite the drama and theatre of Booth’s machine, the basic technology and the suction principle was the same as in most vacuum cleaners today. Vacuum cleaners soon got smaller, more portable and—most importantly—cheaper. Smaller motor-powered vacuum cleaners, famously from Hoover and Electrolux, began to appear before 1915.

For wealthier households, the annual evacuation so servants could complete their spring cleaning became a thing of the past. Rich homeowners purchased the new vacuum cleaners, eager to be seen as early adopters of the technology, or looking to retain domestic help made scarce by the First World War.



4. Hoovering for the Masses

The British association of the vacuum cleaner with the word 'Hoover' came from the American company's advertising strategies and dominance in the British market. Asthmatic American inventor James Spangler sold his idea for an electric broomstick-like cleaner—with cloth filter and dust-collection bag attached to the long handle—to William Hoover in 1908.

Attachments for Hoover model 700 vacuum cleaner, c.1930. Science Museum Group Collection.

His invention proved to be arguably the first truly practicable domestic vacuum cleaner. The Hoover Company’s huge British factory, built at Perivale near Wembley in the 1930s, produced smart-looking machines which appealed to the modern consumer.

But vacuum cleaning still hadn't quite made it to the masses. Given the high costs involved in purchasing new electric appliances together with the lack of electrical power provision, most people continued to clean their carpets, rugs and curtains in more traditional low-tech fashion until after the Second World War.

Many 1950s householders would still have identified with Victorian housemaid Miss Kirby's description of carpet cleaning: armed with dustpan, a selection of hand brushes and a long-handled sweeping brush you 'just got down on your hands and knees and brushed'.

Testing hoovers on a rolling carpet device at the Hoover factory, Perivale, 1948. Walter Nurnberg/Science Museum Group Collection.

Vacuum cleaner models

Vacuum cleaners from throughout the 20th century in the Science Museum collection:

Hoover vacuum cleaner, 1919. Science Museum Group Collection.

Hoover 'Junior' vacuum cleaner, 1936. Science Museum Group Collection.

Vacuum cleaner and attachments made by National Utilities Ltd, Manchester, c.1930–1945. Science Museum Group Collection.

The space-age Hoover Constellation vacuum cleaner, c.1956. Science Museum Group Collection.

Hoover Dustette vacuum cleaner, model 100, 1964. Science Museum Group Collection.

The Hoover Building is a Grade II listed building of Art Deco architecture designed by Wallis, Gilbert and Partners located in Perivale in the London Borough of Ealing. The site opened in 1933 as the UK headquarters, manufacturing plant and repairs centre for The Hoover Company.*

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5. The Great Vienna Ferris Wheel

Before his invention of the vacuum cleaner, Hubert Booth was involved in the design of several early Ferris Wheels, including the famous Ferris Wheel in Vienna, known as the Wiener Riesenrad, which was constructed in 1897. The following description of the Wiener Riesenrad was archived in 2021, with acknowledgement and thanks, from Wikipedia and from the official website of the Wiener Riesenrad.

The Wiener Riesenrad (German for Vienna Giant Ferris wheel), or Riesenrad, is a 64.75-metre (212 ft) tall Ferris wheel at the entrance of the Prater amusement park in Leopoldstadt, the 2nd district of Austria's capital Vienna. It is one of Vienna's most popular tourist attractions, and symbolises the district as well as the city for many people. Constructed in 1897, it was the world's tallest extant Ferris wheel from 1920 until 1985.

The Wiener Riesenrad was designed by the British engineers Harry Hitchins and Hubert Cecil Booth and constructed in 1897 by the English engineer Lieutenant Walter Bassett Bassett (1864-1907), Royal Navy, (right) son of Charles Bassett (1834-1908), MP, of Watermouth Castle, Devon. Its purpose was to celebrate the Golden Jubilee of Emperor Franz Josef I, and it was one of the earliest Ferris wheels ever built. Bassett's Ferris wheel manufacturing business was not a commercial success, and he died in 1907 almost bankrupt.

A permit for its demolition was issued in 1916, but because of a lack of funds with which to carry out the destruction, it

survived. It was built with 30 gondolas, but was severely damaged in World War II and when it was rebuilt only 15 gondolas were replaced.

The wheel is driven by a circumferential cable which leaves the wheel and passes through the drive mechanism under the base, and its spokes are steel cables, in tension.

Share of the Wiener Riesen Rad Ltd., issued 21. March 1898.

Height

When the 64.75-metre (212 ft) tall Wiener Riesenrad was constructed in 1897, both the original 80.4-metre (264 ft) Ferris Wheel in the US (constructed 1893, demolished 1906) and the 94-metre (308 ft) Great Wheel in England (constructed 1895, demolished 1907) were taller. The 100-metre (328 ft) Grande Roue de Paris, constructed in 1900, was taller still. However, when the Grande Roue de Paris was demolished in 1920, the Riesenrad became the world's tallest extant Ferris wheel, and it remained so for the next 65 years, until the construction of the 85-metre (279 ft) Technostar in Japan in 1985.

In popular culture

- The Riesenrad appeared in the post-World War II film noir The Third Man (1949).

- The wheel is featured in the 1973 spy thriller Scorpio (1973)

- The 1987 James Bond film, The Living Daylights features scenes throughout the Prater, around the wheel, and a lengthy romantic scene on the wheel.

- The Riesenrad appears in the film Woman in Gold (2015), about the repatriation of a Klimt portrait stolen by the Nazis from a Jewish Viennese family.

Construction

In 1937 engineer Friedrich Beck, who at this point in time could look back on a career at the Giant Ferris Wheel spanning over almost 40 years, compiled a technical description of the Giant Ferris Wheel which is still valid today.

The city's authorities initially raised objections to the construction of the Giant Ferris Wheel which was an unusually bold project for the time. Only after Johann Brick, professor for bridge construction at the Technical University of Vienna, had examined the project and submitted his calculations to the municipal planning and building control office did it receive a building permit.

In principle, the Giant Ferris Wheel is set up like a bridge, which in its form consists of two identical semi-circles placed on top of one another. These are suspended from the hub of the large axis by means of 120 flexible spokes, although during rotation only those which are near the vertical plane facing downwards are weight bearing.

The large axis of the Giant Ferris Wheel – 10.9 meters long, 0.5 meters in diameter, 16.3 tons in weight – was supplied by the steel works W. Beardmore & Co from Glasgow, Scotland. This axis revolves in two open bearings, each of which is mounted where the heads of the 4 pylons come together. This load-bearing construction transfers the weight of the entire wheel together with that of the axis, the spokes and the cabins onto the 8 foundations of the pylons.

Building the Giant Ferris Wheel was no easy task and even transporting the axis posed difficulty.

The wheels of the carriage that transported the axis from the railway station to the building site of the Giant Ferris Wheel and which was drawn by 16 horses sank into the soft ground of the Prater and had to be freed with a special hoisting apparatus before further transport was possible.

Later a track capable of bearing this weight was constructed along the entire route so that the axis could be safely moved. Steam-powered cranes then raised the axis to its final height of 33.5 meters over the inclined plane

of two pylons and then embedded it into the two bearings mentioned earlier.

The pylons and the wheel were built without the use of scaffolding. Steam cranes with pivot arms, standing on three wooden towers which rose in height as construction work progressed, hauled the different parts of the iron structure upwards. The wheel was assembled in a self-supporting manner in that first of all a wheel segment was suspended from the hub of the large axis by means of cable spokes. Then a further segment was connected to the left and the right of it and secured to the hubs by the spokes. In this fashion, construction advanced. The wheel therefore supported itself during construction, the more so as the individual segments were connected to the hub of the large axis by the cable spokes.

The outer circumference of the rim is connected to the inside by radial latticework and by two diagonal tension rods. The western rim facing the city is also rigidly connected to the eastern rim facing the Prater at a distance of 6 meters by means of latticework and tension rods. Between said radials, the structure connecting the outer circumference with the inner circumference, a cabin is suspended at each joint between two wheel segments. Each cabin is 5.4 meters long, 2.45 meters wide and 2.65 meters high; they are suspended on a steel axis so that the floor remains in a horizontal position even as the wheel rotates.

Technology

So much for Mr. Beck’s account from 1937. The inner spokes which secure the circumference rim to the axis consist of steel wire ropes with a diameter of 10 cm and grommets at the ends. Of the 120 spokes which are mounted at the suspension points of the cabins, 60 are fitted at right angles to the axis, while the remainder are diagonal, in order to provide extra resistance against wind pressure.

The wheel rim consists of steel plates and brackets, whereby the brackets face outward and are connected to the circumference opposite. As a result, the circumference forms a girder to which the inside spokes referred to earlier are attached. The 6.35 meter long outer spokes are riveted to the inner and outer circumference cover plates by latticework.

The outer circumference of the wheel is also made of U-shaped girders, namely two parallel girders which are connected both to each other and to the inner circumference of the wheel rim by flat steel supports. The circumference spokes form the extension of the steel wire rope spokes and consist of riveted beams, which are directly attached to the two concentric wheel rim rings.

The Giant Ferris Wheel is powered by two traction cables which permit the transmission of the necessary torque through friction pads on the outer

sides of the wheel rim. The two drive motors work on a single shaft in order to guarantee synchronization of the two traction cables. The further transmission of power to the rope drive is carried out over pulleys and a two-stage transmission.

The slipring motors from 1984 produce 15 kilowatts and rotate at a speed of 720 revolutions per minute.

In 1988 the cogwheels from the post-war years and the complete drive propulsion system were replaced.

In 1997 and 1999 the Giant Ferris Wheel was completely repainted. After extensive sand blasting work, 200 tons of old paint and sand were removed and only 4 tons of new anti-corrosion paint applied as protection against wind and weather for the decades to come.

Even those visitors who are not particularly interested in technical details often ask what would happen in the event of a power cut. We can reassure Giant Ferris Wheel passengers: we have an emergency generator which is permanently monitored and which is able to guarantee standby operations at any time. It also lights up the area in front of the Giant Ferris Wheel. However, if – as is only theoretically possible – that too should fail, the Giant Ferris Wheel can still be operated manually.

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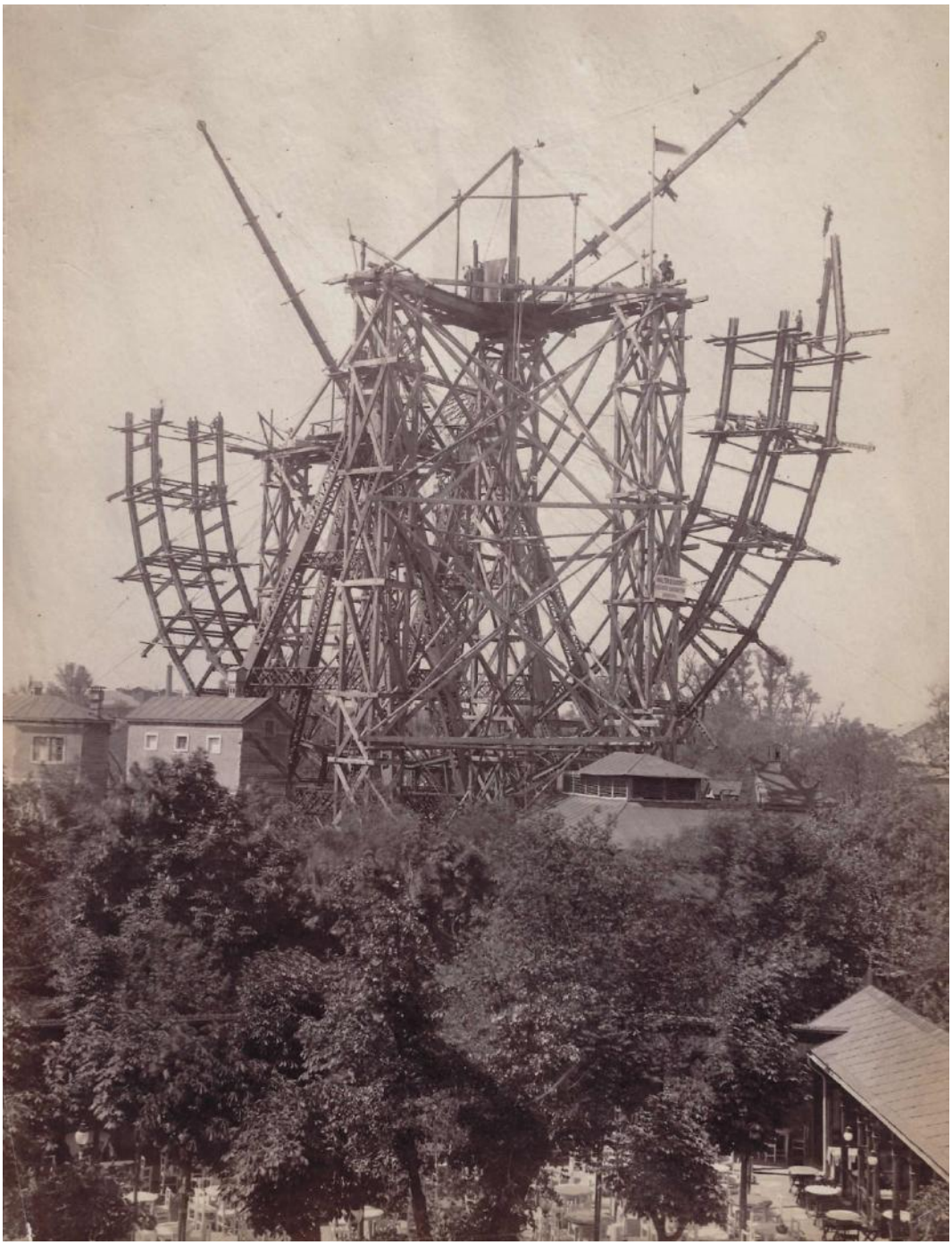
6. Vienna Ferris Wheel Timeline

1897



The Giant Ferris Wheel was built to celebrate the Golden Jubilee of Emperor Franz Josef I.

1898

Das interessante Blatt

Redaction und Administration: Wien, I., Schulerstraße 22. (Telephon Nr. 1534 im interurbanen Verkehr.)

Nr. 27. Erscheint jeden Donnerstag. Wien, 7. Juli 1898. Abonnements durch jede Buchhandlung und Postanstalt. XVII. Jahrg.

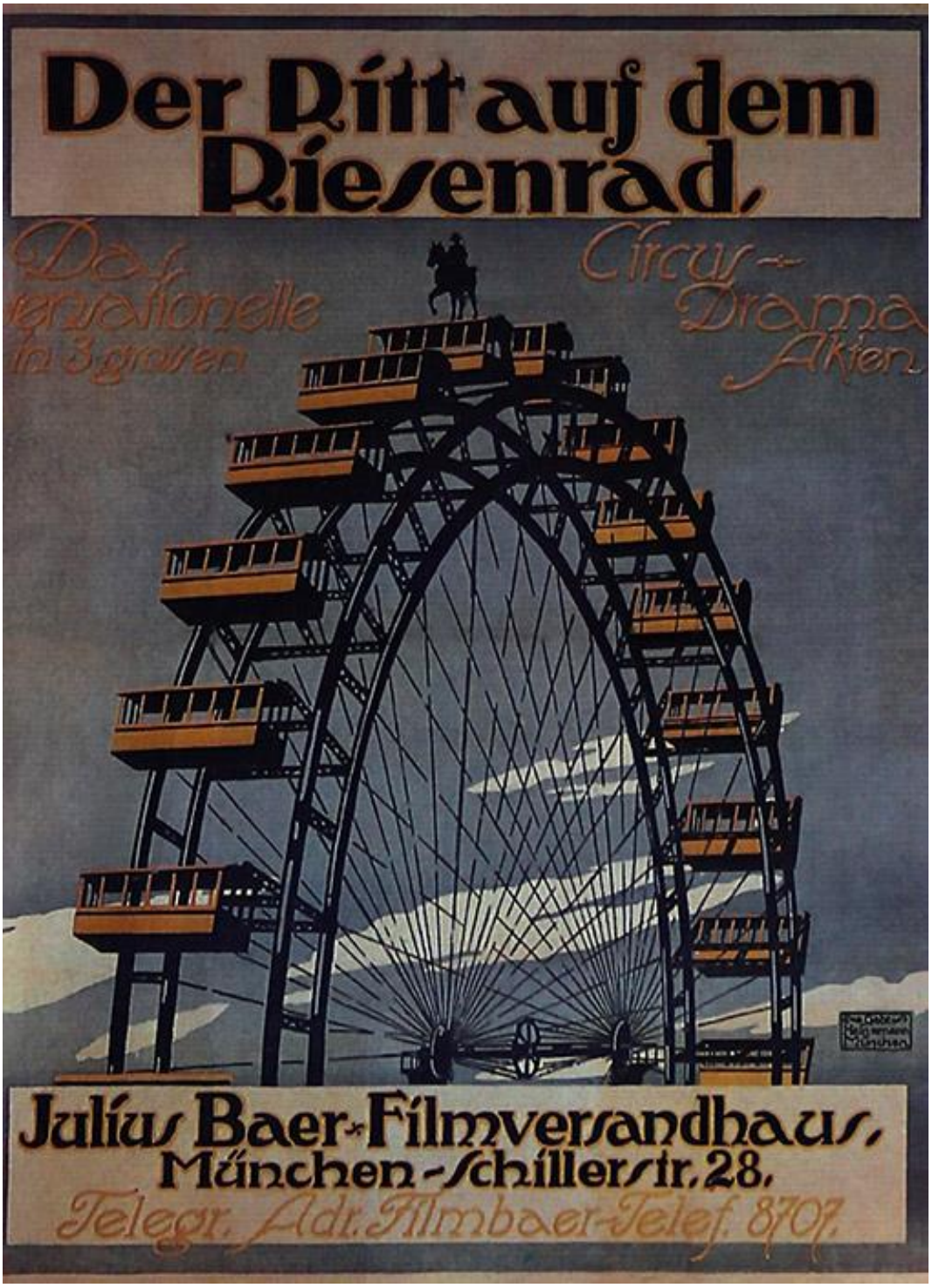
Ein verwegenes Kunststück auf dem Riesenrad in „Venedig in Wien".

Die Artistin Marie Kindl hängt, mit den Zähnen sich an einem Seil haltend, an einem Waggon des Riesenrades. (Siehe Seite 2.)

Die heutige Nummer ist **20** Seiten stark und enthält **ein Preisräthsel,** auf dessen **richtige Lösung** ein Preis von **zwei Losen im Cours-Werte von 127 Gulden** ausgesetzt ist.

To draw attention to the poverty surrounding her, her husband and others in the city, Viennese woman Marie Kindl hangs on to a rope she held between her teeth outside of one of the cabins during a ride.

1914



Madame Solange d'Atalide, the successful circus director and rider, completes a full rotation of the Giant Ferris Wheel on a horse standing on the roof of one of the cabins as part of a film.

1916

A demolition permit is issued, but the Ferris Wheel is saved due to a lack of funds with which to carry out the destruction.

1944

The Giant Ferris Wheel is burned down.

1945

The Wheel is rebuilt, at the same time as St. Stephen's Cathedral, the State Opera House, and the Burgtheater.

1947

The Giant Ferris Wheel is taken back into operation. Instead of the originally 30 suspended wagons, the Ferris wheel is now only equipped with 15 wagons. For cost reasons, only 4 instead of 6 windows are installed.

2002

It’s the dawning of a new era for the Giant Ferris Wheel. On 1 May 2002 eight lost cabins are returned. They complete the Wheel of History as part of the Panorama exhibition and take visitors on a journey through the history of Vienna and the Prater.Since 1 May 2002 the Giant Ferris Wheel has illuminated the night skies of Vienna bathed in gold and silver light. On 1 May 2002 the Prater and Vienna gained this new attraction which harmoniously brings together the old and the new, the past and the very present, tradition and high-tech.
