History, Channel Tunnel

Eurotunnel

Railway company · eurotunnel.com

Groupe Eurotunnel SE manages and operates the Channel Tunnel between Britain and France including the vehicle shuttle services, and earns revenue on other trains through the tunnel. It is listed on both the London Stock Exchange and Euronext Paris. Wikipedia

Stock price: GET (EPA) €12.20 +0.03 (+0.25%)
Oct 1, 5:35 PM GMT+2 - Disclaimer

Founded: August 13, 1986

Headquarters: Paris, France

CEO: Jacques Gounon

(Google)

Groupe Eurotunnel SE

Type	*Societas Europaea*
Traded as	Euronext: GET
Industry	Rail transport
Founded	1986
Headquarters	Paris, France
Key people	Jacques Gounon (Chairman and CEO)
Services	Operation of Channel Tunnel infrastructure; freight rail transport; car shuttle train services
Revenue	€1,207 million (2014)[1]
Operating income	€334 million (2014)[1]
Profit	€57.1 million (2014)[1]
Total assets	€7.363 billion (end 2014)[1]
Total equity	€1.758 billion (end 2014)[1]
Number of employees	3,959 (end 2014)[1]
Subsidiaries	Europorte GB Railfreight MyFerryLink[2]
Website	www.eurotunnelgroup.com

(Wikipedia)

Eurotunnel Group, world leader in rolling motorway and piggyback transport

The Channel Tunnel: a vital link

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Euronext Paris, 01/10/2015, 17:35
GET share price: **€12.200**

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› Letter to shareholders: Eurotunnel on Track - 4 September 2015
› Dividends 2014 paid in 2015
› Financial calendar

In the spotlight

› Eurotunnel is grateful to the many customers who have sent messages of confidence and support for the company and its staff
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› Jacques Gounon, Chairman and Chief Executive Officer of Eurotunnel Group, comments the results for the first half of 2015

› View all the online videos

1

2

3

4

5

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7

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11

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13

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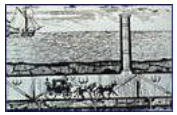
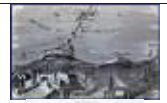
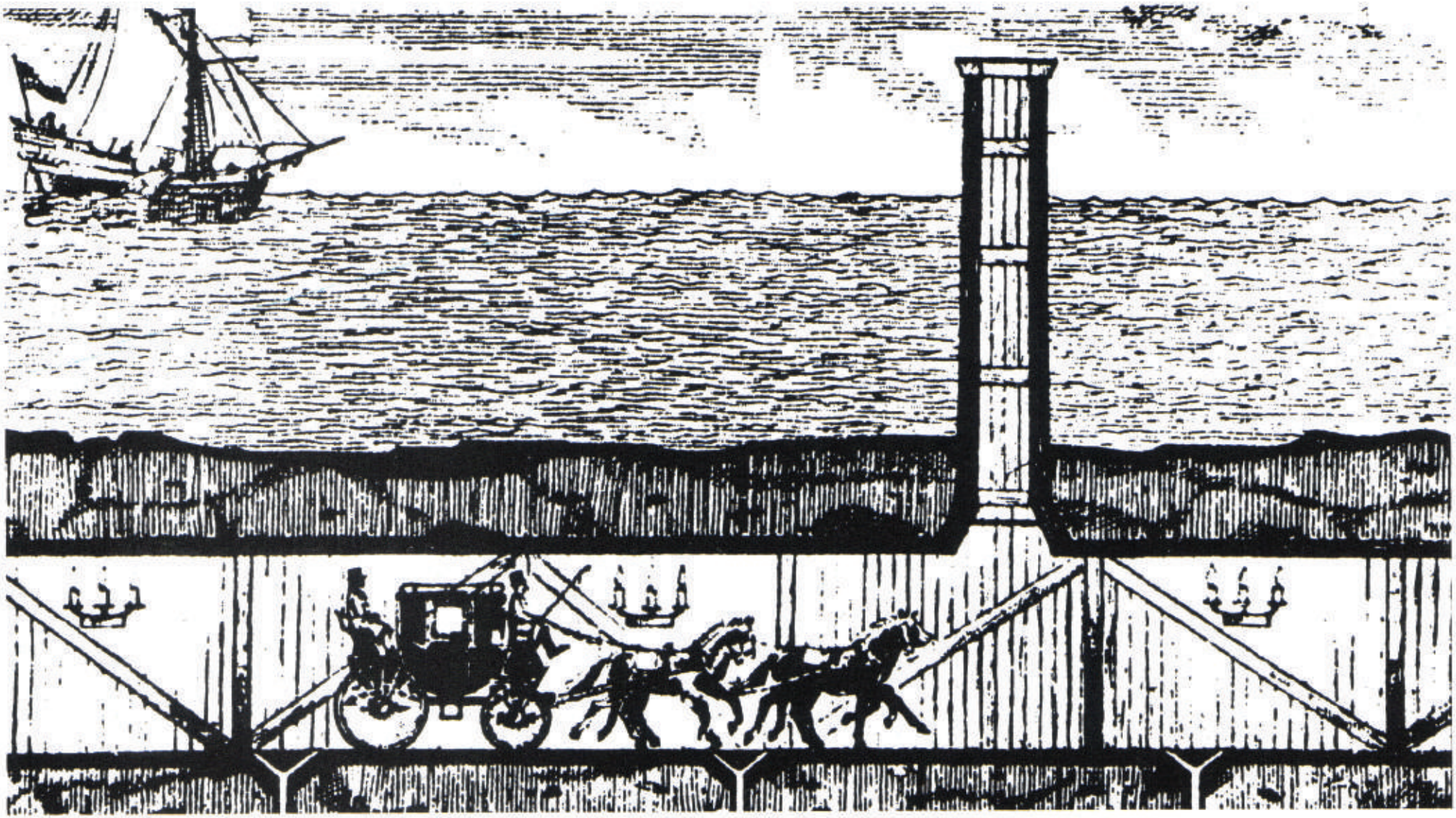
18

History, first 100years

Early projects		
1802		
		In 1802, French mining engineer Albert Mathieu-Favier put forward the first ever design for a cross-Channel fixed link based on the principle of a bored two-level tunnel: the top one, paved and lit by oil lamps, to be used by horse-drawn stagecoaches ; the bottom one would be used for groundwater flows.
1803		
		In 1803, the Englishman Henry Mottray unveils another project for a cross-Channel fixed link: a submerged tunnel made of prefabricated iron sections.
1834		
	 	From 1830, the advent of steam trains and the construction of the rail network in Britain led to the first proposals for a rail tunnel. By the mid 19th century, French mining engineer, Aimé Thomé de Gamond, spent 30 years working on seven different designs.
1855		
		**25 August** During the state visit to France in Versailles, Queen Victoria and Napoléon III approve the proposed under sea tunnel designed by Thomé de Gamond, which was later on presented in the *Exposition Universelle* of Paris in 1867.
1880		
		The first attempt of a tunnel excavation began in 1880 when the « Beaumont & English » tunnel boring machine began digging undersea on both sides of the Channel.
1909		
		**25 July** Louis Blériot was the first to fly an aeroplane across the Strait of Dover and in 37 minutes.
1955		

1802

In 1802, French mining engineer Albert Mathieu-Favier put forward the first ever design for a cross-Channel fixed link based on the principle of a bored two-level tunnel: the top one, paved and lit by oil lamps, to be used by horse-drawn stagecoaches; the bottom one would be used for groundwater flows.



Albert Mathieu-Favier's design, presented to Napoleon in 1802

But not all mad ideas are modern. It is a little known fact that the Channel Tunnel started life as an olfactory experiment. Back in 1802, peace broke out when Britain and France signed the Treaty of Amiens. Albert Mathieu-Favier, a French engineer, got the First Consul, one Napoleon Bonaparte, interested in his idea. In Favier's tunnel carriages would be drawn by teams of horses, which would be changed every five miles. It would be lit by candles. But despite powerful support from the makers of clothes pegs, the tunnel foundered.

BBC NEWS

Pipe dream

The first serious design of many over the years was for a tunnel used by horse drawn vehicles, lit by candles and with regular air shafts projecting above the waves.

More outlandish ideas included a tunnel with sections moved into place by balloons, and filling in the Channel to create a narrow strip of land with gaps at intervals for shipping.

Another plan, to overcome the fear of invasion, was for a viaduct to connect the tunnel to dry land – if necessary the link could be severed by artillery shells.

French Revolutionary Wars

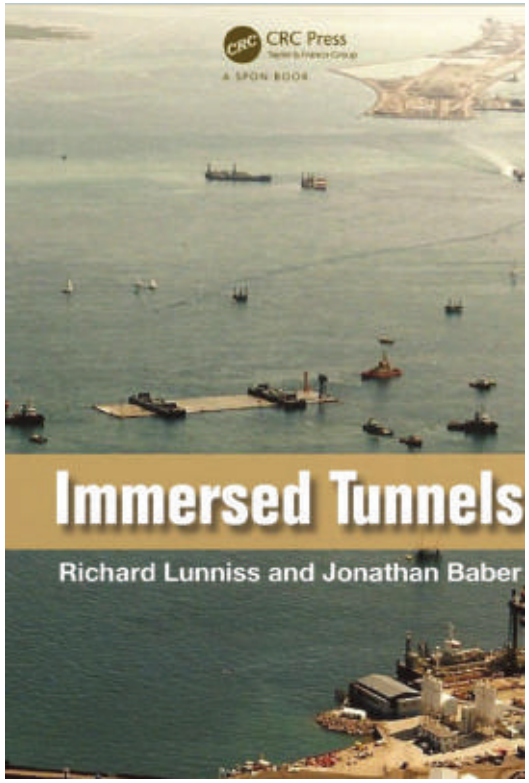
Main articles: French Revolutionary Wars and Napoleonic Wars

From 1793 to 1815, France was engaged almost continuously (with two short breaks) in wars with Britain and a changing coalition of other major powers. The many French successes led to the spread of the French revolutionary ideals into neighboring countries, and indeed across much of Europe. However, the final defeat of Napoleon in 1814 (and 1815) brought a reaction that reversed some – but not all – of the revolutionary achievements in France and Europe. The Bourbons were restored to the throne, with the brother of executed King Louis XVI becoming King Louis XVIII.

The French Revolutionary Army defeated the combined armies of Austrians, Dutch and British at Fleurus in June 1794.

1803

In 1803, the Englishman Henry Mottray unveils another project for a cross-Channel fixed link: a submerged tunnel made of prefabricated iron sections.



Chapter 2

Development of the immersed tunnel

The idea of the immersed tunnel arrived some time before a project was actually realized. The first concepts were developed in England in the early 1800s, at the time Brunel was starting out on his Thames Tunnel in London. The birth of immersed tubes and shield-driven tunnels therefore occurred at around the same time, even though immersed tubes were much slower to be implemented.

In 1803, a British engineer, Henry Tessier du Motray, proposed linking England and France by an immersed tunnel constructed from cast iron tunnel elements laid on the bed of the English Channel. This was one of a number of similar schemes proposed at the time, but the imminent threat of a French invasion by Napoleon meant that none of these ever progressed. In 1808, another British engineer, Richard Trevithick, proposed a method of construction for a crossing of the river Thames that involved building sections of tunnel within dewatered cofferdams formed of timber piles. Once completed, the brick tunnel sections would be backfilled to the original riverbed level, and the cofferdam removed and reconstructed 50 ft further along the tunnel alignment. By progressing the cofferdam across the river, the tunnel would be formed. Although this was essentially a cut and cover method of construction, it featured many elements of the techniques now employed for immersed tunnels and was an important stepping stone toward the development of the first ideas for building them.

The tunnel was proposed to be of brick construction, although he later suggested the tunnel sections could be cast iron. Trevithick's proposals were submitted to the Thames Archway Company, which was trying to build the first tunnel under the Thames, but were not adopted, and in 1809, the company launched a competition for a new crossing of the Thames. They received 54 proposals, and in 1810, accepted the one from Charles Wyatt. This was to become the first true immersed tunnel concept. Wyatt's idea was to excavate a trench and immerse 50 ft long brick cylinders into it. The ends of the cylinders would be sealed with temporary spherical brickwork

bulkheads to enable them to be watertight and to float. Each would have a simple ballasting arrangement for sinking.

Wyatt's scheme was well engineered; for example, he had considered the possible impact of ships' anchors damaging the tunnel and ensured the trench would be deep enough so that once placed and backfilled, there would be 6 ft of earth covering the tunnel. The Thames Archway Company decided to trial the new technology to test the methods and outcomes, in particular, the method of forming the tunnel joints, the strength of the cylinders, the accuracy of placement that could be achieved, and the disruption to river traffic that would be caused. John Isaac Hawkins was appointed to construct two 25 ft long cylinders with an internal diameter of 9 ft. The trial was carried out in shallow water so that the tops of the cylinders could be inspected at low water, and manhole access was provided to enable internal inspections. The wall thickness of the tubes was 13½ in and each cylinder weighed 52 t, requiring 8–10 t of water ballast for immersion. The cylinders were built on submersible barges and scaffolding was constructed in the river to lower and position the cylinders. Because of the heavy river traffic, there was a frequent need to repair the scaffold following numerous collisions. The cylinders were transported by tying them alongside a barge. Once they were maneuvered into the scaffolding, lowering lines were attached to the cylinders along with masts to control positioning. After immersion, gravel backfill was placed manually around the cylinder to lock it in position. Hawkins's scheme is shown in Figure 2.1.

When the second element was placed, a mixture of mud and gravel was placed around the joint and the tunnel dewatered. Although some leakage of the joint occurred, it was considered that it would be possible to seal the joints with puddled clay. Although the concept was considered technically feasible, undoubtedly the methods of sealing the joints may have proved problematic in the full tunnel construction and would have needed some further engineering development. Sadly, because of the cost of the trials in 1811, the Thames Archway Company decided to abandon the project, but it was the first full-scale use of the technique and was groundbreaking engineering for its time.

The development of ideas continued in the United Kingdom after this, through to the mid-nineteenth century, by engineers such as John de la Haye, who published extensive discourse on the possible applications and construction methods for submerged tunnels in *The Mechanics' Magazine, Museum, Register, Journal, and Gazette* in 1845. He considered the use of cast iron submerged elements to construct tunnels in a number of locations around the United Kingdom and for a Dover to Calais crossing to France. He proposed external ballasting methods and looked closely at the safety benefits and cost benefits the technique would have compared to the new shield tunneling techniques being used beneath the Thames. In fact, a number of new projects were proposed in the mid-nineteenth

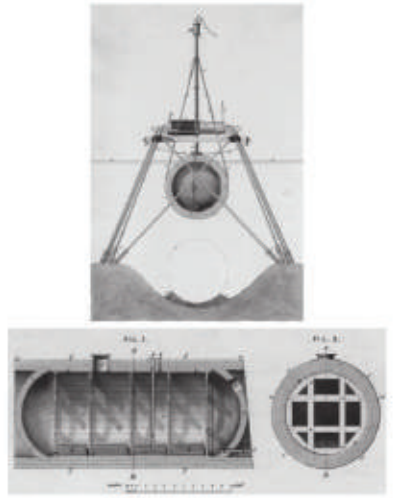
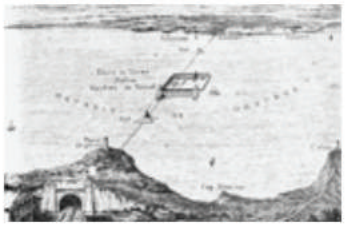


Figure 2.1 Charles Wyatt's immersed tunnel proposals. (Courtesy of Institution of Civil Engineers Library.)

century that used the immersed tunnel idea. These included further proposals for crossing the English Channel by French engineers, but they were not progressed due to continued national security concerns. There were also a number of immersed tunnels proposed on railway projects in various western European countries. At the same time, ideas were beginning to emerge in the United States. However, the next attempt at construction was back in the United Kingdom, when a new immersed tunnel beneath the Thames in London was proposed in 1865 for the Waterloo and Whitehall

1834



From 1830, the advent of steam trains and the construction of the rail network in Britain led to the first proposals for a rail tunnel. By the mid 19th century, French mining engineer, Aimé Thomé de Gamond, spent 30 years working on seven different designs.

Aimé Thomé de Gamond

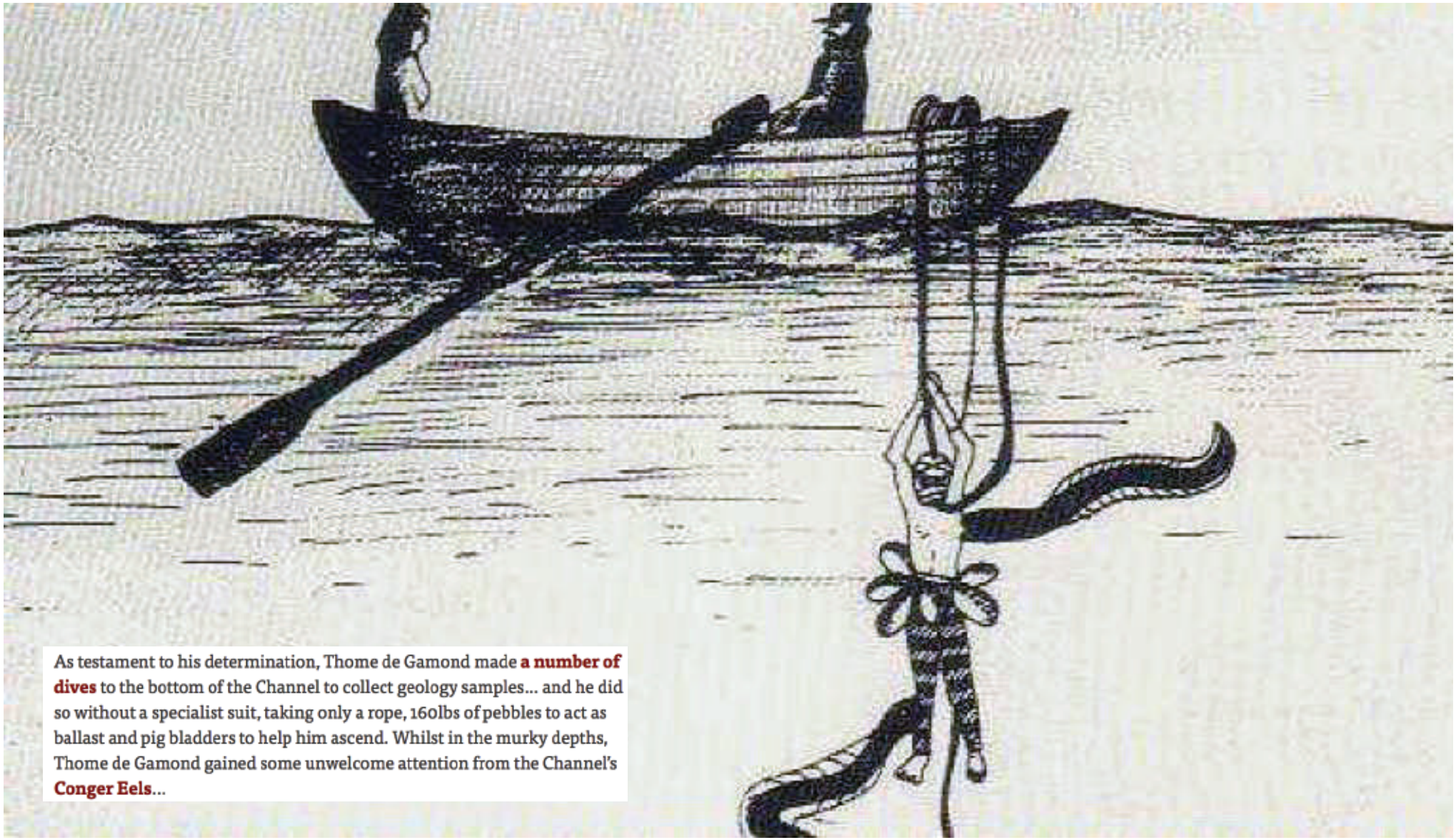
From Wikipedia, the free encyclopedia

Aimé Thomé de Gamond (Poitiers, November 1807 - 1876) was a French eccentric engineer and entrepreneur who lived during the 19th century. He is called the "father of the tunnel between France and England".

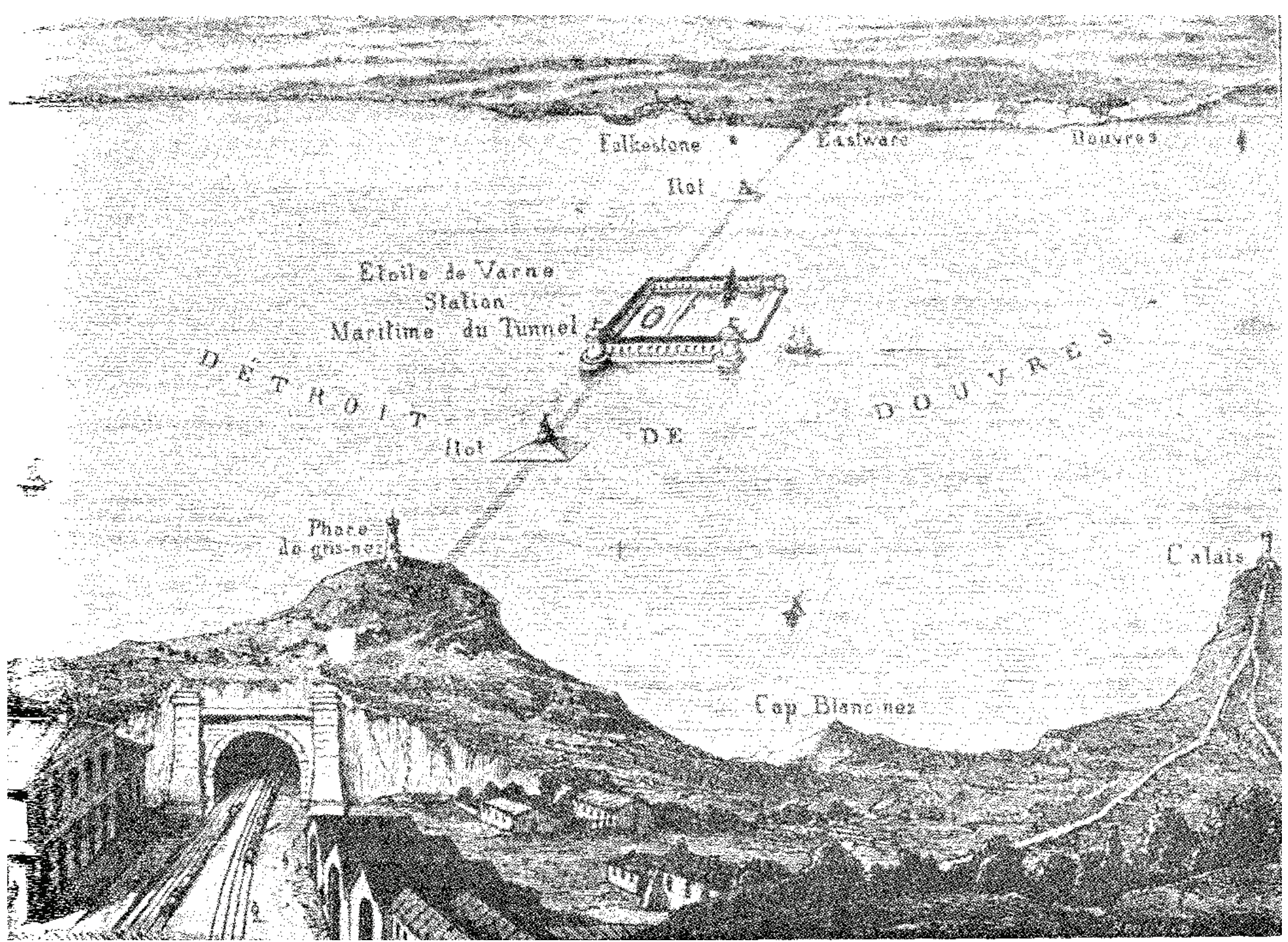
He studied to become a mining engineer in the Netherlands and then came back to France. In 1834 he proposed his first projects for a tunnel beneath the English Channel. Gamond spent all his wealth and 30 years of his life promoting this 200 year old dream. However, at the time both England and France thought that separation made better political and economical sense.

In 1856, he presented a proposal to the emperor Napoleon III for a mined railway tunnel from Cap Gris-Nez to Eastwater Point with a port/airshaft on the Varne sandbank at a cost of 170 million francs, or less than £7 million.[1] He would propose in total seven designs.[2] His proposal was finally accepted in 1867 by Napoleon III and Queen Victoria but the Franco-Prussian War of 1870 brought an end to the project.

Gamond's fiercest supporter was his daughter Elizabeth, who actually rowed the boat from which he dived to the seabed to perform geological surveys. Even after his money dried up, she taught music to finance his chimeric enterprise. However, the tunnel was not to be; Gamond died ruined and humiliated in 1876.[3]

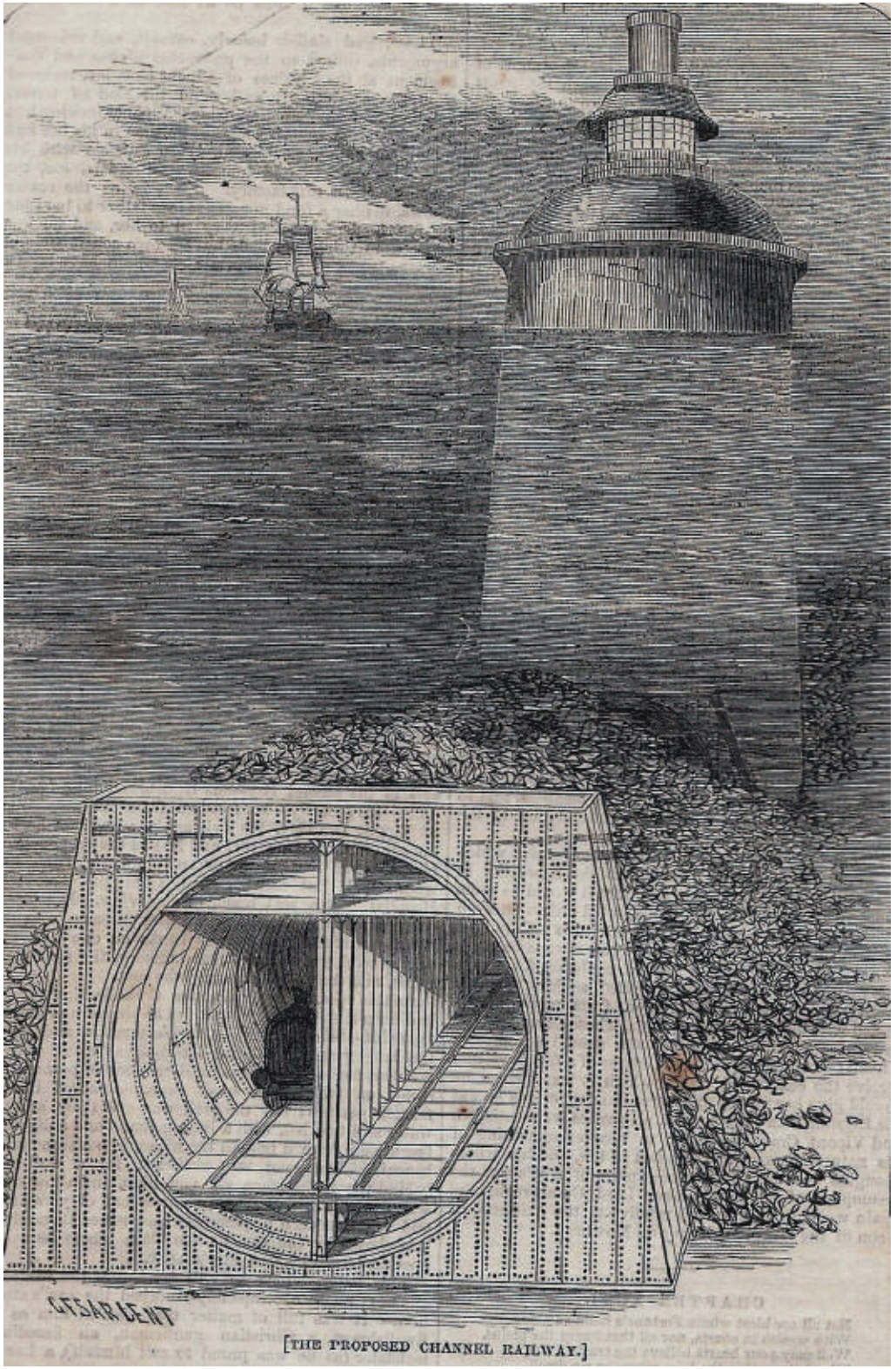


As testament to his determination, Thome de Gamond made **a number of dives** to the bottom of the Channel to collect geology samples... and he did so without a specialist suit, taking only a rope, 160lbs of pebbles to act as ballast and pig bladders to help him ascend. Whilst in the murky depths, Thome de Gamond gained some unwelcome attention from the Channel's **Conger Eels**...



Sketch of Thome de Gamond's proposal which included a harbor in the middle of the Channel

Cross section of Thome de Gamond's vision



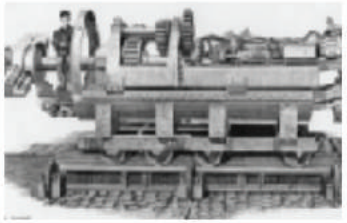
[THE PROPOSED CHANNEL RAILWAY.]

1855

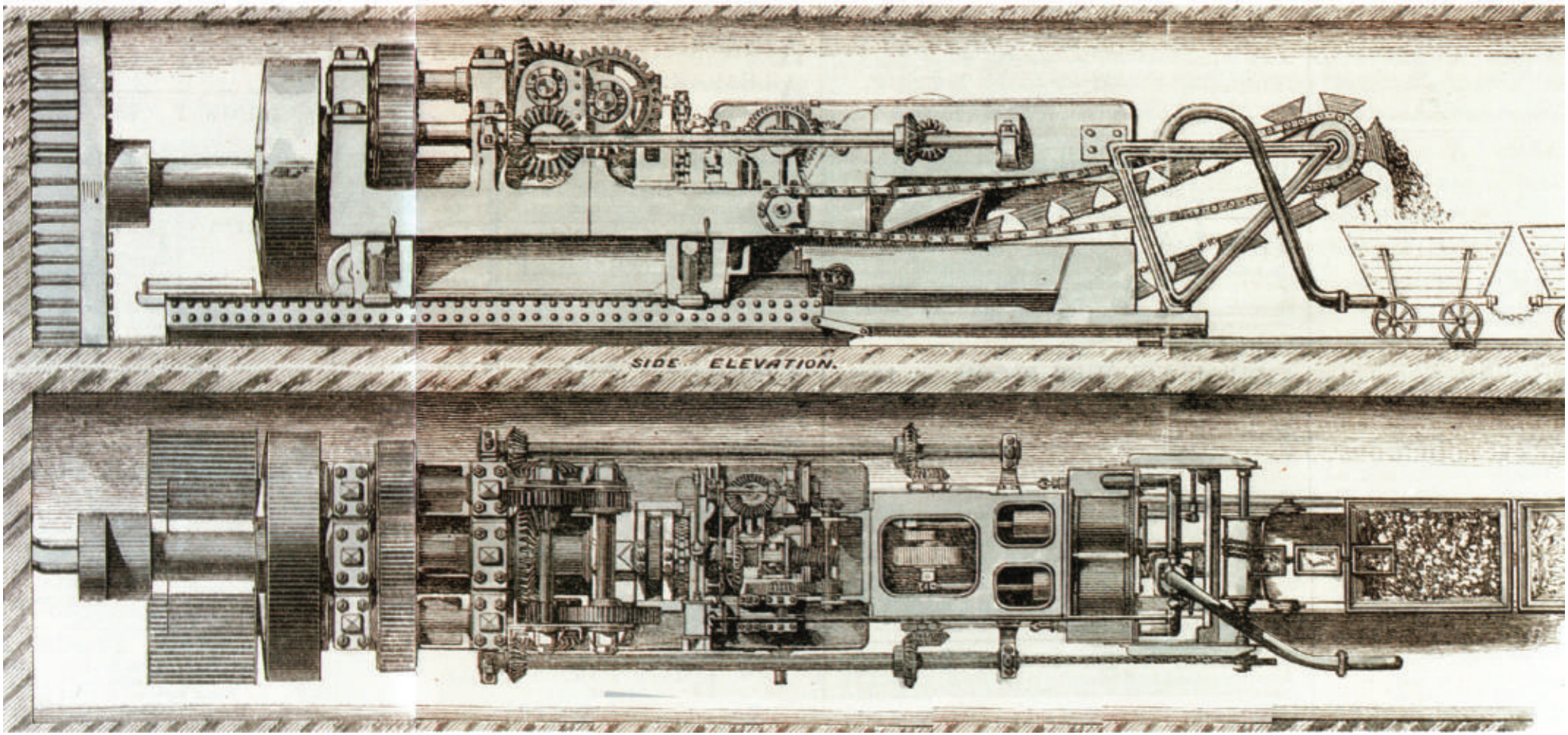
25 August

During the state visit to France in Versailles, Queen Victoria and Napoléon III approve the proposed undersea tunnel designed by Thomé de Gamond, which was later on presented in the Exposition Universelle of Paris in 1867.

1880



The first attempt of a tunnel excavation began in 1880 when the « Beaumont & English » tunnel boring machine began digging undersea on both sides of the Channel.



SIDE ELEVATION.

Both tunnels were to have been bored using a compressed air boring machine invented and built by Colonel Fredrick Beaumont MP. Beaumont had been involved with the Channel Tunnel Company since 1874 and had successfully bored a number of tunnels without the use of explosives and 3 ½ times faster than manual labour. It was not however Beaumont's boring machine that was used. Captain Thomas English of Dartford, Kent patented a far superior rotary boring machine in 1880 capable of cutting nearly half a mile a month and it was this not Beaumont's machine that was used on this first attempt at tunnelling under the channel. The tunnel was credited to Beaumont in 'The Engineer' magazine and despite letters of protest from English the editor refused to correct the mistake and Beaumont did nothing to clarify the situation. Even to this day this early Channel Tunnel trial is often credited to the Beaumont machine.

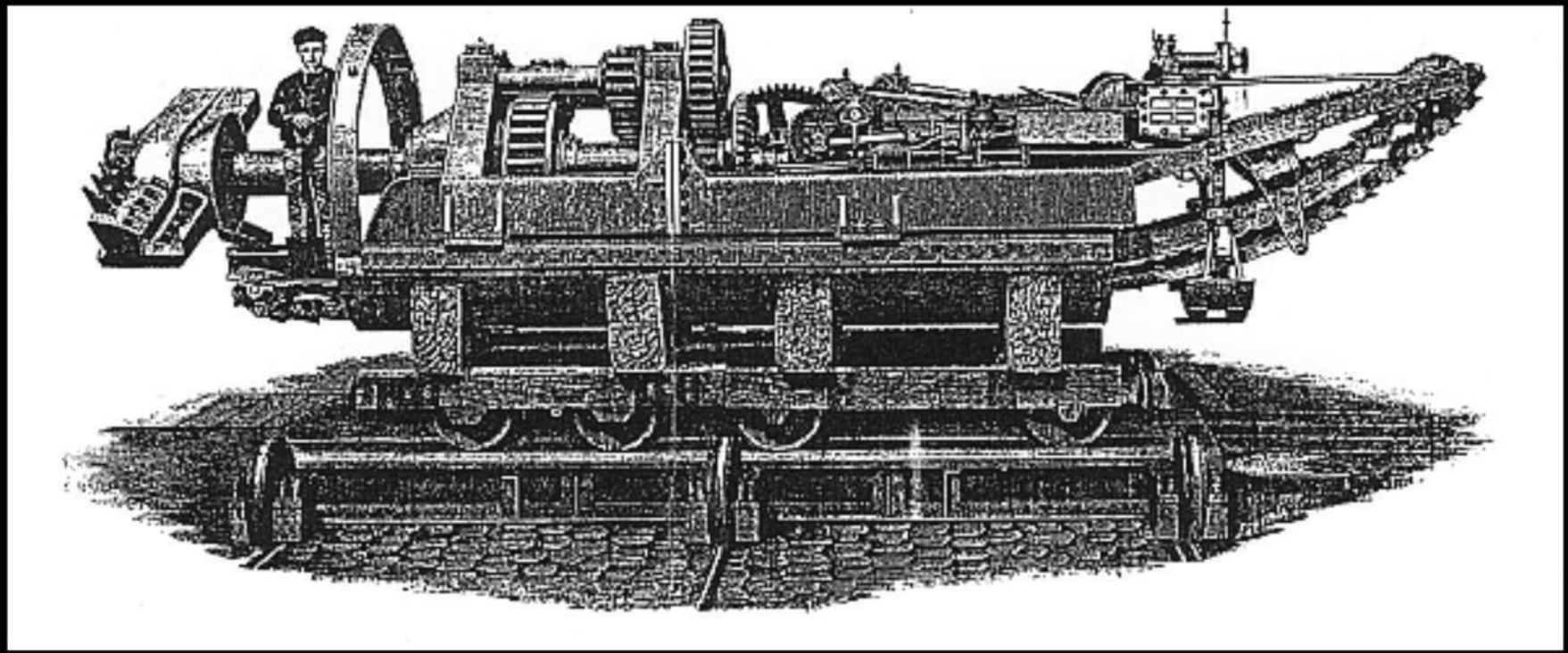


Photo:TheBeaumont - English boring machine

http://www.subbrit.org.uk/sb-sites/sites/c/channel_tunnel_1880_attempt/index.shtml

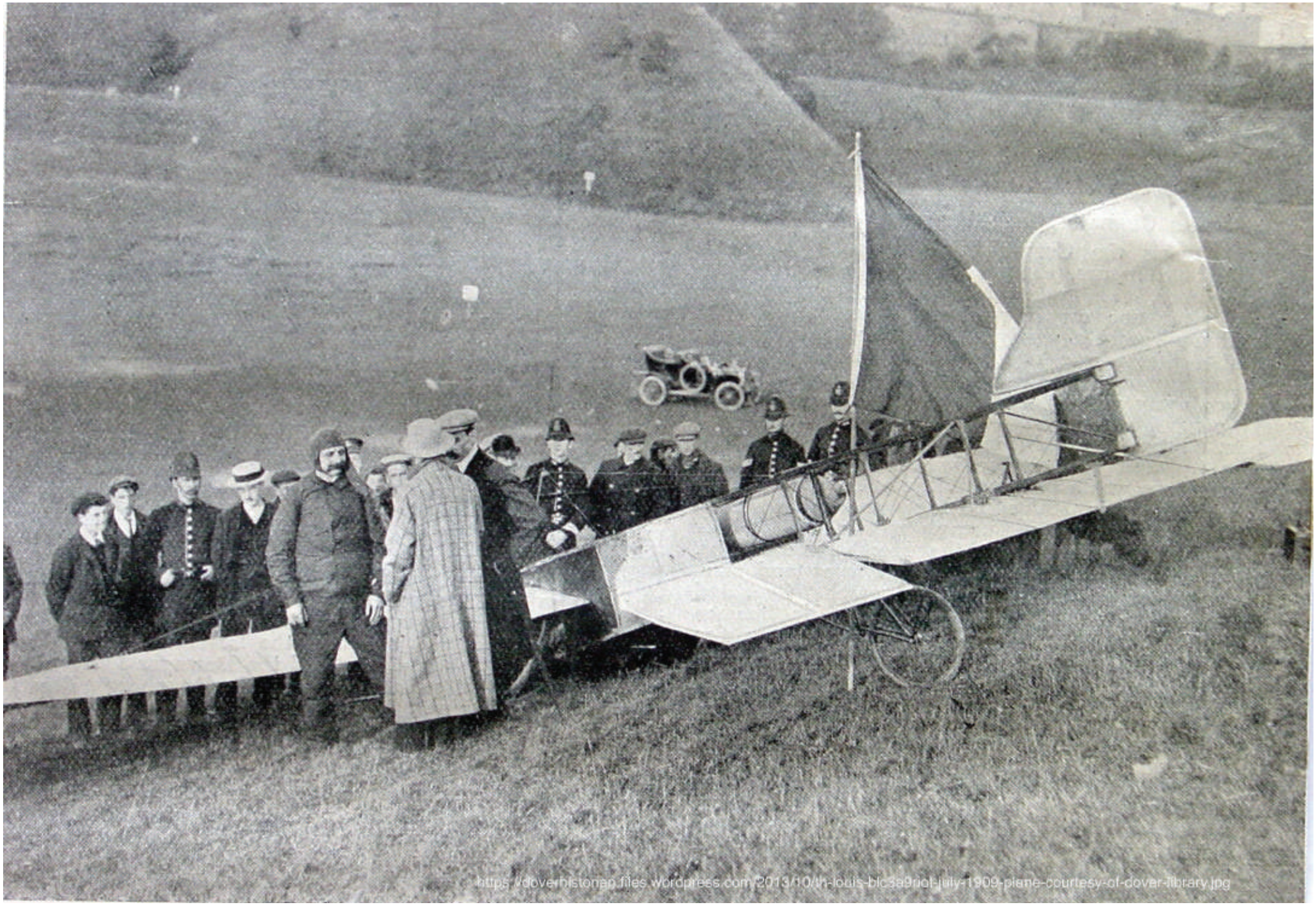
1909

25 July

Louis Blériot was the first to fly an aeroplane across the Strait of Dover and in 37 minutes.

The feat of flying across the English Channel in a heavier than air machine has been accomplished under remarkable circumstances the successful aviator being M. Bleriot, who made the flight in a monoplane of his own construction.

It was early in the morning that the news reached Dover that Bleriot contemplated making the flight, and a few minutes later came the wireless message that the plucky aviator was actually on his way across from the French coast, having ascended at Baraques, a village two miles to the westward of Calais, at 4.35 a.m.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