



ROBERT & LUDVIG



Robert's intention in 1876 was to found his own firm, *Robert Nobel & Co.*, and for that he needed Ludvig's technical advice and continued financial support. In 1875 he travelled to St. Petersburg to discuss the further development of the business with his brother, to whom he had earlier sent detailed calculations of the costs of constructing oil reservoirs, water pipes and more besides for a total sum of 50,000 roubles. Robert was not counting on any profit for 1875 but already the following year the firm should be "a considerable business", in the course of a few years becoming "one of the most splendid in the country."

It was the third time that Robert had travelled to the capital to brief Ludvig and to discuss the future with him. One reason why he decided to make the arduous journey was the slow postal service. During the summer half of the year it took two weeks for a letter to arrive, during the winter, six. As the letters moreover often crossed each other, exchange of views as well as decision-making was rendered more difficult. Since during the summer months "only 6 ideas can be exchanged and during the remaining 6 winter months only 3, making a total of 9 for the year" Robert was sometimes forced to act without asking Ludvig for advice, which he regretted. Nine ideas a year was naturally starvation rations for individuals with the Nobel brothers' propeller-driven intellect.

That Robert, during this visit, finally succeeded in convincing Ludvig of the potential of his project emerges from a letter which Ludvig wrote to Alfred after Robert's departure and in which he urged Alfred to join in the oil business:

Robert has returned to Baku after his trip to the East coast and has found excellent naphtha at a depth of 10 fathoms on the island of Chelek. He is now as a result supplied with raw materials. We shall now see if he knows how to manage the production and the sales on a large scale. It is on this that his future success and happiness will come to depend. For my part I have done what I can, by assisting him with money



& advice of a technical nature. Robert says himself that he has made new discoveries in the distillation and purification of the oil. I cannot judge their value, as I am not well-versed in the field. ... The main thing is and remains, however, to understand how to prosecute the work on a big scale and in a sensible way. I keep thinking that we, i.e. you and I, ought to travel there together to see if we cannot help him in some way. We after all have succeeded in becoming independent and we ought therefore to try to help Robert to also achieve the same status. Think therefore about travelling to Baku with your devoted Ludvig.

Ludvig's exhortation to Alfred to visit Baku fell on deaf ears. He remained in Paris. Ludvig himself had been tempted to keep Robert company when he left St. Petersburg in November but he decided to stay in the capital. It was late in the year, he was apprehensive about "filthy weather for the return journey" and therefore decided to postpone his trip to the spring.

EXCISE DUTY ON PARAFFIN

One thing that the brothers discussed was the excise duty on paraffin. The tax was not particularly onerous – over the years it oscillated between 25 and 5 kopeks per *pud* – but it hit producers of good paraffin hard as it took longer to produce than the inferior product. The excise duty thus constituted an obstacle both to improvement of the product and to expansion of the oil industry in general. It also represented a significant disadvantage in competition with American paraffin, which because of the lack of good transport facilities in Russia was cheaper to import to St. Petersburg, Moscow and even Tbilisi than that made in Baku.

As long as the excise duty was in force Robert's efforts were concentrated on trying to manufacture high-quality paraffin with a distillation time as short as that for the poor-quality product, and he was successful in this. His paraffin was, as we have said, as good as the American stuff, if not better. "The very fact that I can produce a distillation superior to the American one is something that I would like to make use of to overcome the excisemen's zeal for regulations. I therefore intend to send some *pud* to the Imperial Russian Technological Society in P-burg with a little explanation of their advantages over the American product ... with a request that the Society will undertake to save this industry, so important for Russia, from ruin."

The question of the excise duty on paraffin was so urgent that a government commission was set up, based in Tbilisi. Robert took an active part in its work, his views were quoted in the press and together with three other industry practitioners he was invited to the Caucasian capital to present his

ideas to, among others, Grand Duke Mikhail Nikolayevich, brother of the Tsar and governor of the Caucasus. They had met earlier and the Grand Duke showed Robert, “in his capacity of expert on the Naphtha industry in Baku”, such goodwill that he felt embarrassed. He also received praise for his work on Chelek. “Overall I had the satisfaction that they turned to me first of all and with the greatest degree of trust. We have every reason to believe that my stay in Tbilisi will result in improved legislation and in addition I have the satisfaction of being the first Swede in this place on whose behalf something like this has happened.”

The Technological Society’s Caucasian section in Tbilisi was also involved in the effort to do away with the duty on paraffin, but the most important contribution was made by the parent society in St. Petersburg, which set up a commission tasked with examining the question. It was led by the Duke of Leuchtenberg and among the members were Ludvig, the oil producer Kokorev and the chemist Mendeleev, who already in the 1860s had forecast that the oil industry in the Caucasus had the prerequisites to achieve “not only Pennsylvanian but even more comprehensive and substantial dimensions”.

Robert sent examples of his paraffin to the Technological Society in Tbilisi as well as to the capital and urged Ludvig to work “in the direction I have suggested” through his contacts in the Society. This Ludvig did, on numerous occasions in discussions about the oil industry emphasising the harmful effect of the excise duty on the development of the industry. He also published a long article in the Society’s transactions, “Views on the oil industry in Baku and its future”, which presumably would have contributed to the abolition of the duty on 1st September 1877. Like the abolition of the contract system four years earlier, the tax concession had a speedy and positive effect. During the following decade production of paraffin in Baku increased from 4.5 million *pud* annually to fully 32 million at the same time as it became four and a half times cheaper.

“BRILLIANT RESULTS”

Robert bought De Boer’s factory in the first place to expand it – as well as for the site itself; it was too late for him to acquire a site of his own in the Black City. From the perspective of the future he had mapped out the De Boer factory was too small and shortly after its acquisition he began work on expanding it. Its profitability – he and Ludvig were convinced – was wholly dependent on the scale of production. As soon as the acquisition was completed he ordered necessary materials from St. Petersburg: gas-taps, valve covers and connecting links for gas-pipes, gas crowns of



pig-iron, fireproof clay, and more besides. In order to pay for the expansion, from the summer of 1875 onwards he asked Ludvig for around 10,000 roubles a month.

Apart from coopers, watchmen and other workers Robert's remaining fellow-workers, like drilling-master Axling, were almost all Swedes: the engineer Martin Westvall, who began as a copper-smith in St. Petersburg in the 1860s and had been employed in an engineering workshop in Baku before becoming manager of Robert's little workshop, the head of production, mining engineer August Awelin, who came to Baku immediately after graduating from the Technological Institute in 1874, and Samuel Dahlgrén, who kept the books. Robert also sought out a good chemist from Sweden and tried to persuade Alarik Liedbeck, who was about to stop working at the Nitroglycerine company, to come to Baku, but Liedbeck chose instead to move to Paris and take up a post with the French Dynamite Syndicate (*Syndicat des fabriques de Dynamite*).

The work of extending the factory took longer than expected, for practical as well as administrative reasons. "The accomplishment of my programme here in the East is progressing slowly, but the difficulties are so many that no-one in Europe can have the faintest idea about it", he complained to Alfred in the spring of 1876. "The higher authorities as well as my rivals are being to realise that I conduct my affairs quite differently to what is usual here. The former are very attentive to me here and the latter exert all their power to damage me." Robert had hoped that the factory would be ready by the summer of 1876, but it took until September.

Ludvig, as we mentioned, had asked Alfred to contemplate a journey to Baku in order to get an impression on the spot of the oil industry and Robert's contributions. In the spring of 1876 Robert did the same. "Come here soon!" he urged his brother. The exhortation fell on deaf ears yet again, Alfred did not come – but Ludvig did. In mid-May 1876, when the factory was as good as finished, he travelled down to Baku in company with his 17-year-old son Emanuel.

There are no details of his stay but that Ludvig was impressed by what he saw is beyond a doubt. From now on he no longer contented himself with sending monthly sums of money but took an active part in the development of the



Robert's letterhead with the Russian transcribed.

business. Through conversations and correspondence with Robert, Ludvig was well-prepared when he came to Baku. He had also read up on the subject. When he had visited Paris earlier in the spring Alfred had given him a book about prospecting for oil in the USA, which he pounced upon: Andrew Cones & Walter R. Johns' *Petrolia: A brief history of the Pennsylvania petroleum region*. "Ever since we parted I have been almost exclusively occupied with studying the petroleum question", he wrote to Alfred. "The book you gave me ... not only gave me a whole lot of interesting details but strengthened me in my plans and calculations for methods of transport and showed that in all respects I have calculated and thought correctly about the way in which to transport and store the oil." Everything that Ludvig wanted to do in Baku had already been done in the USA and was described in detail in the book of 650 pages, not least the transport and storage questions. "In America such an enterprise has already been carried out on a large scale and everything they have done there on those lines is characteristic of the most profitable businesses to be found in America", he wrote to Alfred. "The model is to hand – calculations easy to make and clear as day."

Ludvig was now so convinced of the business's potential that he devoted the summer, which he spent in Stockholm, to working out "a detailed essay on the subject" intended to show "the advantages of the business". In order to get a better understanding of conditions in Baku as well as "some of the authorities in the Caucasus" he travelled there again in October of the same year. With him he had an engineer who was going to help him to work out his "major proposals, to set up a line of communication to transport the oil on a large scale from Baku to the Russian market". The enterprise would not be difficult to bring to fruition and the profit would be "enormous". In order to cover the costs of preparing the paraffin he and Robert had taken on as a partner "Old Man Standertsköld", who had invested 150,000 roubles in the form of securities for a bank loan.

However, the big outgoings were on the transport side and to cover these Ludvig envisaged founding a limited company or limited partnership company with a capital of around 2.5 million roubles or 10 million francs. "You mustn't think I am exaggerating, or that I am counting on unusually favourable trading conditions!" he wrote to Alfred, who still had to be convinced. "I can prove to you the accuracy of my calculations and claims – and I am happy to be able to tell you this, as it will please you for Robert's sake, as he has had more than enough unpleasantness to endure and a good many difficulties to overcome down there in that rather disagreeable hole – called Baku."

One of the "authorities" that Ludvig met in the Caucasus was Grand Duke Mikhail, who granted him an audience in Tbilisi on his way home



and who promised to do all he could to promote the success of the business. After his arrival home Ludvig reported to Alfred that Robert had achieved “brilliant results”. While the other producers of crude oil extract “30% heavy and poor product, he is getting from the same naphtha 40% excellent and light paraffin, which can perfectly well match the prime quality American product”. Right from the start, therefore, the business should be able to offer the market a product “that will give the firm a ‘brilliant’ reputation”. The factory’s production capacity was already considerable but could “with an increase in the size of the machinery” be quadrupled.

“VIEWS ON THE OIL INDUSTRY IN BAKU AND ITS FUTURE”

The activity that Ludvig set in motion after first becoming acquainted with Baku is deeply impressive. His report on the future of oil, “Prospectus for the formation of an Oil-producing and transportation Company in Bakou”, was intended to be used to persuade investors to invest in the brothers’ oil project, and he sent it to Alfred in the form of a brochure in several languages. His thoughts coincided with those that Ludvig presented in the abovementioned essay “Views on the oil industry in Baku and its future”, in which he sketched out a detailed programme for how Russian oil extraction could be developed into an enterprise on an international scale.

The resources, according to Ludvig, were infinite, the opportunities great and the problems that stood in the way of such a development were easy to identify. For comparison he cited the oil industry in Pennsylvania, which in only fifteen years had developed into an extremely profitable enterprise thanks to the introduction of efficient means of extraction and transport. On several occasions Robert’s contributions in Baku are also mentioned, especially in the distillation of paraffin.

The most important points in the 16-page-long essay concerned the extraction of oil, its transport to the refineries and markets as well as storage issues.

In Baku, as we mentioned previously, the methods of extraction were very primitive and the boreholes gushed out oil that there was no capacity to utilise. After a gush or pumping out of the boreholes the oil was collected in pools dug out of the ground, from where it was pumped out into barrels containing around 25 *pud* (a good 400 litres) or poured into leather sacks. The barrels were then secured under an *arba* with a wheel-height of fully two metres while the sacks were loaded onto the cart. The oil was then transported from the oilfield on non-existent roads the ten kilometres or so to the refineries in the Black City. In the USA, on the other hand, for several years the oil had been pumped from the oilfields to the refineries

Frågor angående i Pennsylvanien använda rör ledningar
för transporterande af Petroleum samt järn reservoarer för dess bevarande

ledningar.

Finnas ledningar på betydliga sträckor -? och af hvad diameter -
Hvad för sorts rör användas, tackjärn, smittjärn eller bra?
Hvilken tätning användas bly eller tackjärnsement -?
Är något skickligt att observeras vid rörens föreningar som ej brukas vid
vanliga ledningar?
Begagnas vid smittjärnsrör ledningar annat än vanliga skruf-
muffar för rörens sammanfogning.

pumpar

Begagnas något ovanligt slags pumpor för oljans befordran
genom rören eller för dess pumpning till cisterner - Hvilken
sorts pumpor är mest använd och hvilken firma tillverkar
dem och hvad kosta de?

Jernbaners transport
i cisterner.

Hvilka medel användas för oljans transporterande i Jern-
banor. Är det jerncisterner, fasta eller flyttbara, huru dan
är deras construction, rymlighet, dimensioner, tykkel af
platan samt kronor eller ventiler för i och utloppning -
är platan dubbelt nitad? begagnas något inre medel för att
förhindra rostning -

injicering

Är det möjligt att använda Jerncisterner för oljans injicering
vara? jag vet att det har begagnats både stora och små
Huru äro reservoarierna konstruerade, hafva de stey och för stark-
ningar - huru tyck plåt begagnas? nitas de dubbelt -
Smörjas eller beklädas de invändigt med något - Lim, papp
cement eller tegel?

Önsket är önskvärdt att få veta, om några
svädes erfarenhets i öfvergifna, angående transporterung och bevaring
af olja - såväl råa som raffinerade.

L. Nobel

Ludvig's memorandum about the future of the oil industry from Alfred Nobel's archive.

through cast-iron pipes. There they had also built tanks of iron for storage of the oil, something that not only eliminated the risk of leakage but also allowed the oil producer to await better market conditions instead of having to sell his product immediately. At the same time in the USA they were beginning to build railway lines designed exclusively for oil transports. None of this could be found in Baku, which according to Ludvig was because of insufficient enterprise together with a lack of knowledge as well as capital.

As regards the financial rewards of oil manufacturing, Ludvig pointed out, Baku oil contained only 33% of light oils (suitable for producing paraffin) while the corresponding figure for oil in Pennsylvania was between 60 and 80%. In the USA, moreover, the remaining percentage was collected and used for the gas-lighting of towns and as lubricating oil. In Baku on the other hand *mazut* was sold for next to nothing or burnt off because of the fire risk. This surplus oil was valuable in itself and could be used, for example, for making asphalt – which according to Ludvig could among other things solve the problems involved in paving the streets in Russia's southern regions where there was a lack of stone. Because of the excise system, however, there was no profit in manufacturing asphalt.

The biggest problem, as we have already mentioned, was the delivery of oil products from the refineries out to the markets. It took place in vats which held 20 *pud* or 320 litres. But this method of transport was both impractical and costly. A whole cooperage industry was needed, wood was a scarce commodity in unforested Baku and the vats were therefore expensive. The costs of these in actual fact exceeded the value of the finished product. Moreover they leaked, in particular if they had to be stored for a long time in the oil depots, which was the case during the winter half of the year, when the ice ensured that navigation ceased. Then the barrels became leaky. The leakage amounted on average to 15% of the contents.

From the harbour transport was by sailing-ship to the Russian markets over the Caspian Sea and then up the Volga. The difficulties, as we saw, were many – among others, the heavy seas, which meant that the barrels were often smashed and went on fire. But the biggest problem was caused by the so-called nine-foot-roadstead. The northern part of the Caspian Sea, by the outflow of the Volga, is very shallow. Ships must therefore stay out on the open sea for trans-shipment onto flat-bottomed barges with tugs that carried the oil over the shallow roadstead. As the depth of the water, in certain wind conditions, was only two feet, the oil sometimes had to be reloaded yet again. Every such reloading took several days and required a good deal of manpower, the barrels received knocks and the risk of leakage and fires was imminent. Depending on weather conditions the sailing-ships could make between five and eight trips a year and only during the summer

half of the year, when the demand for oil for lighting was at its lowest. If storage depots could be built on the other side of the nine-foot-roadstead a major logistical problem would be solved.

What Ludvig suggested as a rational means of transport between the refineries and the markets was a system of tanks, pipes and specially-built steamboats. Hand-carts would be replaced by pipes which with the help of steam-pumps would carry the oil from Balachani to the refineries in the Black City. There, after being refined, it would be kept in iron tanks, after which it would be conveyed down to the harbour and over in steam-boats which in their turn were furnished with tanks. Such a vessel would be able to make about forty trips per season and the trans-shipment would take two hours instead of two days and nights. Once past the nine-foot-roadstead iron tanks would also be built in Astrakhan, mainly for storing *mazut* oil. The paraffin on the other hand would be transported further on the Volga on barges fitted out with tanks to places with railway stations, where it would be pumped over into tanks on land that were big enough to cater for Central Russia during the winter half of the year where no deliveries could be made. From these depots the paraffin would then be transported further out into the countryside by rail in specially-built tankers.

“The implementation of the suggested methods of transport and storage of oil and its by-products should not only safeguard the Russian oil industry against crises and difficulties, caused by dependency on [price fluctuations on] the American market”, Ludvig concluded his essay, “but should also create opportunities to develop in a correct and independent manner to a level, where Russian oil products could also compete successfully with American paraffin on the European market.”

LUDVIG'S PROGRAMME

The completion of Robert's factory coincided sadly enough with a rise in the price of oil so great that the reserves were emptied. As Robert did not have access to his own oil he could not therefore produce any paraffin. Moreover, freight costs on “the damned *arba* carts” rose by 50% and coopers' wages went up so that “these robbers will not content themselves with less wages than 5 to 6 roubles a day”. The laboratory experiments continued, however, and Robert reported to his nephew Emanuel that he had succeeded in producing a paraffin that was more or less odourless and colourless: “If you take two glass cylinders of white glass and pour paraffin into one and water into the other, it is only the light refraction that reveals in which one the paraffin is contained.” In only a few years Robert had shown that he was perhaps the best paraffin distiller in Baku.



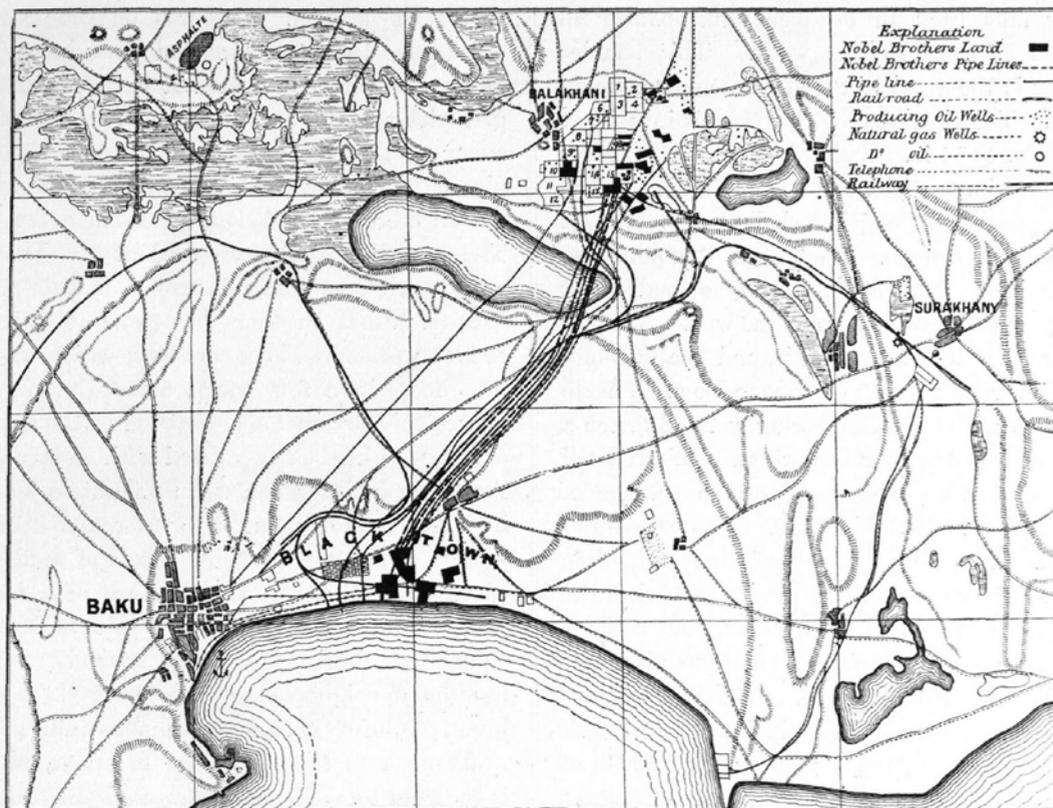


Illustration in the journal *Engineering* showing the pipelines from the oilfields to Nobel's wharf in the Black City.

Engineer Sven Almqvist, technical head of the Motala workshop.

The lack of raw materials meant that instead of immediately starting up production on a large scale, Robert was on the contrary forced to reduce the number of his workers. Although the position was “tricky” he did not want to invest the last of his own resources, as his wife and children, in the event of his death, would then be “beggars”. To find capital in Russia was impossible, but the prospects of interesting foreign capitalists were great and from Alfred, “it sounds good”, Robert told his bookkeeper Dahlgrén. In February 1877 he took himself off to Paris to discuss the future with his brother and later in the spring Ludvig travelled there on the same errand. Meanwhile the price of oil returned to a normal level and access to raw materials stabilised. Production went up and by the summer the factory was producing 1,000 barrels of paraffin a week.

This initial setback, though, was only a little dip in the graph that Ludvig drew up in his “programme”, which he called “the suggested measures” in the letters to Alfred. In the

first place, the programme had been formulated before the crisis occurred, in the second place Ludvig was thinking long-term and was well aware that the price of oil was subject to constant fluctuations. Therefore he was not worried and the pipes for the oil pipeline were ordered, despite the poor state of the economy, immediately. The order went to the Clyde Tube Works in Glasgow, which manufactured pipelines for the oilfields in Pennsylvania.

The pipes were delivered as early as the spring of 1877. But laying them out took time. Robert and Ludvig tried initially to interest other Baku producers in the idea, from reasons of cost but also in order to put pressure on the local authorities who were doubtful about the project as they feared that the new technique would lead to mass unemployment among the local population. Their rivals however were not interested, out of fear of giving up their independence or because of conservatism or both. Ludvig and Robert had therefore to take the project forward by themselves. Large parts of the land between Balachani and the Black City were desert which was owned by the state and the local authorities refused initially to give permission for the pipeline, but after Robert turned to Grand Duke Mikhail and Ludvig paid court to high-ranking officials in St. Petersburg they were forced to give way. But the work was hindered by carters as well as coopers, who saw their future threatened. Eight watch-towers were therefore set up along the pipeline and armed Cossacks were stationed there to patrol the area.

The contract was handed to the engineering firm Bari, Sytenko & Co. under the technical leadership of the young, and, in the future, very successful engineer Vladimir Zhukov. Alexander Bari (1847-1913) was a 30-year-old engineer with an interesting background. When he was fifteen years old his family had been forced to leave Russia because of his father's contacts with Karl Marx. They lived first in Zürich and then in Philadelphia, the capital of Pennsylvania. Abroad, they wrote their name as Bary, as it was spelt in France, the country from which the family had once emigrated.

Alexander studied to become an engineer and made a name for himself by designing a number of pavilions at the World Exhibition in Philadelphia in 1876, for which he was rewarded with a gold medal. Subsequently he returned with his wife and daughter to St. Petersburg. There he came into contact with Ludvig for whom he was like a godsend: a Russian engineer who had worked at the very centre of the American oil boom. Ludvig immediately took him on and sent him to Glasgow to order the pipes for the oil pipeline. Afterwards Bari travelled to Baku, where he spent several months. "Thank you for taking on Bari!" Robert exclaimed: "I have now spent enough time with him to be able to give an opinion about the



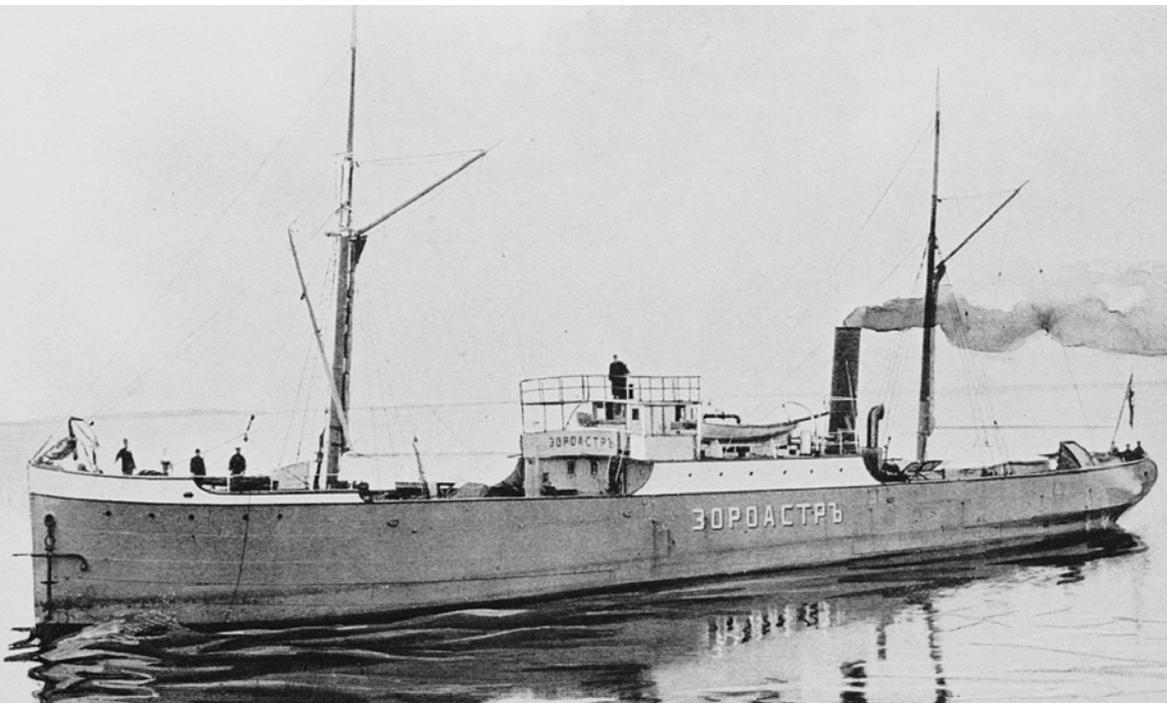
man and although he is without any knowledge of chemistry I regard him as fully competent to carry out his task. He has a good understanding, is modest but knowledgeable and knows how to make himself liked by one and all.”

In December 1877, on behalf of the Nobel brothers, Bari travelled to the oilfields of Pennsylvania to study the latest findings in the field of pipe-laying and drilling techniques and to invite American drill-masters to Baku. When the building of the pipeline was completed in the summer of 1878 he was back in Baku with four drill-masters, who however found it difficult to adjust both themselves and their methods to local conditions, and accordingly returned home after less than a year. “It is high time to get rid of these expensive folk whose only talent was for how to drill in America but who were unable to adapt to our conditions”, Robert complained when the last Americans left Baku in April 1879.

The pipeline had not been cheap but the transport costs from Balachani to the Black City were five times cheaper and the saving of time was enormous. “The pipeline, the tanks etc. etc. are awakening anxiety and envy in our rivals”, Robert was already writing to Ludvig when only a fifth of the pipes had been laid, “they are now beginning to understand where the business is heading but as at the same time they feel themselves incapable of emulating us they are having recourse instead to those weapons that are called intrigues.”

In the first month 841,000 *pud* of oil was sent through the pipelines, a decade later, over five and a half million *pud* per month. Within a year the

Branobel's first
oil tanker *Zoroaster*.



Ludvig himself drew up the rough sketch for the tanker, which was developed in close collaboration with Motala Verkstad's technical director Sven Almqvist; the detailed drawings were made by the engineer Olof Bengtsson. *Zoroaster* was the world's first oil tanker. The vessel's size was determined by the dimensions of the canal system that linked the Neva and the Volga, i.e. the Baltic to the Caspian Sea. *Zoroaster* shipped around 240 tons in eight tanks furnished with double walls with an intervening space filled with water to minimise the risk of fire. On 9th June 1878 the vessel was delivered from Norrköping to St. Petersburg, from where the journey continued through the canal system. Where the channels were too shallow the tanks were lifted out and loaded onto barges until the depth of the water allowed them to be replaced. "The steamboat *Zoroaster* is already now on the Volga – it has succeeded excellently", Ludvig reported to Alfred on 23rd June. The person who steered the vessel from St. Petersburg to Baku was Ludvig's eldest son Hjalmar Crusell, who thereby at the age of 22 made his first known contribution to the family business. After the vessel had been delivered he stayed on for a while with Robert at the paraffin factory.

As early as September of the same year a further two tankers were ordered, *Buddha* and *Nordenskiöld*, which were delivered in the summer of 1879. They were of a different construction, the oil was transported in bulk direct into the holds and they were so big that they were built in three detachable parts in order to be able to pass through the locks in the canal system. Great importance was attached to safety. A series of precautions were taken to forestall the risk of leakage and to ensure the boats' stability. "The construction and building of the vessels was a technical achievement on a grand scale", according to one expert. During the coming years the Nobel oil-tanker fleet would be increased with a number of vessels, with names that reflect an unprecedented geographical, cultural and religious multiplicity: *Moses*, *Mohammed*, *Tatarin*, *Brahma*, *Spinoza*, *Sokrates*, *Darwin*, *Koran*, *Talmud* and *Kalmuck*. Moreover a large number of smaller boats, among other things flat-bottomed tank-barges and rowing-boats, were ordered.

THE NOBEL BROTHERS' NAPHTHA PRODUCTION COMPANY

The paraffin factory was Robert's, but the project could not have been realised without financial support from Ludvig, who regularly transferred money to his brother. By 31st December 1875 the brothers' joint contributions amounted to 185,000 roubles (around 20 million kronor today), of which Ludvig had contributed 150,000 and Robert the remainder. Hen-

ceforth the collaboration between the brothers was formalised and Robert drew up budgets for the years 1876-1878. However the good prospects for the future soon made it clear that the project could no longer be run on a family basis but that a company with several owners must be set up. "The capital is becoming too large for you alone to be the sleeping partner", Robert wrote to Ludvig in January 1876: "In this business large profits can only come with large amounts of capital."

As we mentioned previously Robert was anxious at the same time about his brother's permanently poor health, which threatened to put obstacles in the way of growing the business. Hitherto he had requested money as and when needed, but during discussions in St. Petersburg in the autumn of 1875 they seem to have agreed on regular transfers, something that Robert reminded Ludvig of in a letter written on the same day as the one quoted above. "With age comes the realisation that one's lifetime is constantly growing shorter, and this makes us far-sighted and careful. I must therefore remind you to make arrangements lest, in the event you should fall ill or, even worse, die, I am not maintained by the office, through failure to send the funds required for the continuation of the business. A capital sum of about 10,000 ought to be available here for any such unforeseen circumstance." Robert was 46 years old, Ludvig 44, but death was at this time an ever-present reality. Ludvig's reaction is unknown.

Further capital was contributed, as we said, by Carl August Standertskjöld, who thereby became the firm's third, if not official, partner. In the spring of 1877 a fourth partner joined the business, Pyotr Bilderling, with whom Ludvig had established a deep and trusting relationship while collaborating on their weapon production in Izhevsk, which made both of them very rich. Another important reason for Bilderling becoming a partner was that only Russian subjects had the right to operate shipping lines in Russia. On 10th May 1878, one month before *Zoroaster* left the stocks in the shipyard in Norrköping, a "special agreement" was drawn up between Ludvig and Bilderling, in whose name the boat was registered. Bilderling went into the business with 100,000 roubles and undertook to inject a further 200,000. The agreement was based on those plans for improved means of transport and storage facilities sketched out in Ludvig's brochure "Prospectus ...". "Bilderling's involvement will be very useful, as he is a Russian subject, and things can be put in his name that foreigners have no entitlement to", Ludvig explained to Alfred.

These injections of capital were the first steps on the way to a transformation of the Baku firm, which hitherto had been operated in Robert's name, into a limited company. The investments that Ludvig foresaw in his "programme" were only for the expansion of the paraffin factory to the tune



of two million roubles – the building of tankers and storage depots would require even larger capital investments. In the spring of 1878 Robert was able to report a profit of 40,000 roubles in 14 months, but this did not impress Ludvig. “It was the first year he was in production and you can imagine how much this will please him and lift his mood”, Ludvig wrote to Alfred. “It pleases me greatly too but mostly for his sake, for nowadays I myself am so blasé about money that 40,000 more or less has no effect on my mood.” Robert’s figures were in truth not much to be proud of compared with those that Ludvig could show. The machine factory in St. Petersburg and the arms factory in Izhevsk had a turnover of 25,000 roubles *a day* and in 1877 the machine factory had yielded a profit of 180,000 roubles, of which 64,000 was shared out in bonuses to the employees.

In May 1878, after Bilderling joined the business, Ludvig asked Alfred seriously for the first time if he wanted to be part of the planned limited company. Although everything was going according to plan Ludvig thought it was time to involve other people. “If you now wish to join in the Baku business I must ask you to state how big a share you intend to take and at what due dates in the next two years you would like to pay your instalments.” It would be desirable for Alfred to contribute “a substantial sum” so that Ludvig could “continue with the development of the firm so that it is already fully mature before I need to rely on other and greater capital sums”.

Alfred joined in as a founder of the limited company, but not with any “substantial sum”. Nor was he present at the first board meeting of the company in St. Petersburg at the beginning of September 1878, although according to Ludvig it would “be useful to our business in many respects as your experience in company affairs would be of great service to us”. Instead all the necessary papers were sent to Alfred in Paris for his signature.

Robert, by contrast, came up from Baku in August. His presence, on the other hand, was more important than Alfred’s. Now that the company was to pass from being in his name to a limited company under the name of Nobel Brothers there were many things that had to be resolved, most importantly the questions of compensation. “Robert is here”, Ludvig reported to Alfred, “his health is not bad but he is not in a good mood, he is irritable and tired and I have to tread very carefully in order to manage him without unpleasantness.” The most important question concerned how Robert should be compensated for the work he had put in over the years in Baku. His own preference had been to be compensated with shares, but according to Ludvig this type of compensation was forbidden in law. When Robert turned down Ludvig’s offer to compensate him out of his own pocket Ludvig suggested that the question should be dealt with by

the constituent assembly and there “settled once and for all ... so that no reproaches for arbitrariness or self-interest can be made”.

Just as Immanuel had founded the firm in the 1840s with Colonel Ogaryov, Ludvig chose to go into partnership with a Russian to found his company. Apart from the above-mentioned practical advantages it was tactically smart to involve a respected Russian subject in the formation of such a wide-ranging enterprise. The natural choice was Pyotr Bilderling, with whom after all Ludvig had already come to a private agreement. When the application to be allowed to set up “a limited company under the aegis of Nobel Brothers & Co.” was submitted to the minister of finance on 31st August 1878 it was thus made by “Ludvig Immanuelovich Nobel, merchant *av första gillet* and manufacturer, and Guards Colonel Pyotr Alexandrovich Bilderling”.

The application was a variant of Ludvig’s “programme” and explained in patriotic terms why the limited company had to be set up:

One of the most important reasons for the slow development of the Russian oil discoveries in the Baku area, with its infinite natural wealth of raw materials, is the absence of practical means for the delivery of crude oil from the wells to the refineries and of the refined products to the Russian market.

Well aware of the fact that it was only the creation of cheap and fast means of transport that made it possible for the American paraffin to assume the dominant position on the world market that it has at present, we were forced, in our desire to make our Baku refinery more profitable and modern, to give particular weight to the creation of rational methods for freight transport that requires complicated technical equipment. To this end we have, along with the improvements that were introduced to our refinery, laid out a pipeline with pumps for the delivery of crude oil from the wells to the refinery and of distillate from the refinery to the seashore, special ships with tanks for transporting the oil and oil products in bulk have been built and special oil reservoirs of iron have been erected on the banks of the Volga for storage and safe-keeping of paraffin.

We have already spent almost a million roubles for all this equipment. In order for these different items of equipment to form a mutually functioning organic whole, which makes it possible to deliver our own paraffin to the Russian market in successful competition with the Americans, injections of capital are needed that are twice as large as what has been invested to date.



For the avoidance of speculation a high price was set on the shares – 5,000 roubles, fully 9,000 Swedish kronor in 1879, over half a million today. And the shares were not to be sold to outsiders before they had first been offered to the remaining shareholders.

Along with the application a letter of authorisation was forwarded giving the technical engineer Mikhail Belyamin, who was managing director of the machine factory, the right to represent the firm in dealings with the authorities. The authorisation was necessary as Ludvig and Robert, after handing in the application, had travelled to Stockholm to celebrate their mother's 75th birthday on 30th September. Alfred also came up there from Hamburg, like "a shipload of relatives". Now there was really something to celebrate, not just the actual day of the birthday itself but also the successes in Baku and the founding of the new company! Pauline and Edla were also there, as were five of their children. There were so many family members that they could not all be put up by Andriette but had to stay in the Grand Hotel, where, in Alfred's words, "the furniture is gilded but the food is gruesome".

After the celebration all three brothers went on to Paris and Ludvig then carried on to St. Petersburg. But at Christmas Ludvig and family returned to Stockholm where they stayed for almost a year. Stockholm offered "pleasant diversions" and he was not seriously ill once. Had he not had so many obligations back in Russia, "in particular the Baku affair, which is still being organised", he would gladly have moved back from Russia and settled in Sweden, he confided to Alfred about the beginning of spring, adding: "But it will take several years before I can put everything in order so as to be able to step back myself."

Robert returned to Baku in December 1878. In order for the company to commence operations the articles of association had to be confirmed by the Tsar, and that took time. For the time being, therefore, the business was run in Robert's name, which made him feel ill at ease. One reason was the major works which got under way and which in February 1879, after five years' drilling, led to them finding their own oil. Another reason was his state of health. At the beginning of March 1879 he was afflicted with a severe bout of typhoid fever which confined him to bed for a whole month and came close to costing him his life. His doctor explained that he would scarcely survive such an ordeal again, but this did not worry Robert. The only thing that was meaningful for him was "that the business truly comes alive and is allowed to live on": "For my own part, during the most difficult days of my illness I was quite indifferent and rather longed to die than to wish for recovery." He therefore reminded Ludvig about a question he had

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Его Высочайшему Превосходительству,
Господину Министру Финансовъ



С. Петербургскаго 1^{го} гильдии купца
и заводчика Людвига Эмануиловича
Годельс и Барджіи Полковника Пет-
ра Александровича Гилсдермлинга

Прошение.

Одного изъ главнѣйшихъ причинъ ме-
дленнаго развитія Русскаго нефтянаго
промысла въ Бакинскомъ округѣ, обладаю-
щихъ неизчислимыи природными запасами
сырцаго матеріала, является отсут-
ствіе удобнаго способа доставки сырой
нефти отъ источниковъ къ перегоннымъ
заводамъ, и перегонныхъ продуктовъ изъ
Баку до русскаго рынка.

Вознавая вспомнить, что только устрой-
ство дешеваго и быстрейшаго способа перево-
зки дало Американскому керосину возмозж-
ность встать въ то преобладающее на все-

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asked Robert when they signed the company papers in St. Petersburg: “Is everything now in such good order that in the event of my decease the business may not be affected by any inconvenience?’ Your answer was – yes!”

The fact that the Tsar’s gracious permission was delayed was not because the authorities had any objections to the founding of the company; on the contrary, they gave it their support. On the other hand the ministries involved had their own views on certain aspects of the wording in the suggested regulation. Moreover, the ministry of finance received a verdict from the Governor of the Caucasus, Grand Duke Mikhail, which – as expected – supported the project whole-heartedly. “ ... I see it as my duty to state that two of the founders of the projected Limited Company, the brothers Ludvig and Robert Nobel, owners of an oil refinery in Baku, with their intelligent way of operating the business and their constant improvements in production technology, have significantly contributed to the development of the oil industry, wherefore an expansion of their activity in the aforementioned area would seem to be particularly desirable.”

The law relating to the setting-up of a limited company in Russia demanded that each formation of a company had to be approved and signed off by the Tsar. This royal permission arrived on 18th May 1879. “A telegram from St. Petersburg informs us that His Majesty on 19th May old style approved the company regulations of our Baku enterprise in the name of the Nobel Brothers’ firm with a founding capital of 3,000,000 roubles”, a jubilant Ludvig informed Alfred in a letter from the summer retreat that the family rented at Dalarö. Henceforth the company went under the name of *Branobel*, an abbreviation of *Bratya Nobel* (Nobel Brothers), which was their telegraphic address.

The application had been made by Ludvig and Bilderling, but in the royally confirmed company regulations there were two further founders: Robert and Alfred. The basic capital – three millions consisting of 600 shares at 5,000 roubles – was shared between these four as well as another six shareholders as follows: Ludvig Nobel (1,610,000), Pyotr Bilderling (930,000), Ivan Zabelsky (135,000), Alfred Nobel (115,000), Robert Nobel (100,000), Alexander Bilderling (50,000), Fritz Blomberg (25,000), Mikhail Belyamin (25,000), Albert Sundgren (5,000) and Bruno Wunderlich (5,000).

The board was made up of individuals who in different ways were close to the Nobel brothers. Apart from Mikhail Belyamin it consisted of Ivan Zabelsky, a St. Petersburg merchant of the 1st guild who among other things was involved in the Baku project’s transport questions, Alexander Bilderling, younger brother of Pyotr and like him a colonel, Fritz Blomberg, the machine factory’s trusted chief accountant, Albert Sundgren, a Finnish

businessman and Robert's partner in the lighting-oil business in the 1860s who also at this time was employed at the weapons factory in Izhevsk, and Bruno Wunderlich, a German businessman who had an import firm in Moscow.

At the first shareholders' meeting a board of management was appointed consisting of Ludvig, Robert and Bilderling, with Ludvig as managing director. The Nobel brothers together owned the majority of shares. Even if the deputy members were Russians – Zabelsky and Belyamin – the company thus had a strong family character, something that in the first instance can be explained by a desire for financial and organisational stability in a country with such an undeveloped company culture and poor access to capital as Russia. The fact that the shares were expensive – 5,000 roubles – was as we mentioned due to a desire to avoid speculation. If the business made a profit the owners would receive eight percent of the capital they had invested while the rest of the profit would be shared between them (60%) and the employees (40%), i.e. the same proportion as in the machine factory.

THE MEN AROUND ROBERT

The letter in which Ludvig informed Robert of the Tsar's gracious confirmation of the articles of association continued as follows:

The plan is to have the whole line between Baku and St. Petersburg ready by next summer. We now have 3 steamboats on the Caspian Sea, Zoroaster, Buddha and Nordenskjöld, which are capable of transporting 4,000,000 *pud* of oil to Astrakhan. There are also already steamboats and barques ready to transport this oil to Tsaritsyn & in Tsaritsyn large tanks are being built which hold 800,000 *pud* but these should be further enlarged. We are now working on setting up the railway line to which end around two hundred railway waggons with tanks are under construction and we should now also begin to erect tanks in Moscow and St. Petersburg. To all the above-mentioned should be added only means of transport and storage. But irrespective of these our actual Baku enterprise continues to expand. The distillation process is now working at full power and this year we hope to deliver 600,000 *pud* to the market.

Ambitious plans indeed! Plans that had not only necessitated the founding of a limited company and a significant increase of capital but that also demanded a strengthening of professional competence. Robert, despite his proficiency in manufacturing paraffin, had as we saw long been in search of a competent chemist. In the spring of 1878 Erland Théel, a young acquaint-



tance of Andriette's, enquired about the possibility of a job in Baku. Since Robert, via Carl Öberg at the Nitroglycerine Company Ltd., had ordered the setting-up of a thorough recruitment process?/personnel department? Théel was employed in the autumn of the same year. Théel had been born in 1850 and had qualified as a chemist in 1876, so this was possibly his first job. It turned out to be a stroke of luck, before long Théel became manager of the paraffin factory and remained with Nobel right up to 1888 when he started his own factory for the manufacture of sesame oil.

Another young man who would prove to be indispensable to Branobel was Alfred Törnqvist, born in 1854 and already a qualified civil engineer at the Technological Institute in Stockholm as a twenty-year-old. After some time in the USA, where from 1876 to 1878 he worked in a mechanical workshop and in a reaping-machine factory as well as at the Swedish pavilion at the World Exhibition in Philadelphia, he returned to Europe in the late summer of 1878. In Paris he made contact with Alfred who in turn introduced him to Robert, who had travelled there to meet his brother and to see the World Exhibition.

Robert invited the multi-talented Törnqvist, who showed an interest in industrial chemistry, to begin working for Branobel. In Alfred's laboratory, so Robert reported to Ludvig, the young man had "immersed himself in the matter so speedily and with such judgement that I do not doubt that with Bary's help he will take stock of everything that is needed and that in him we are getting both a skilled and a reliable worker. He is not unversed in chemistry and in general his knowledge is thorough; he is very interested in his task, which is why I dare to express the opinion that our choice was a good one and that the major question will soon be solved both thoroughly and *cheaply*."

The thinking was that Törnqvist should acquire knowledge of the latest discoveries in the field of paraffin distillation at the refinery in Marseilles. However, it emerged that there was not much to find out there. Robert therefore sent him to the oilfields in Pennsylvania, just as he had done the year before with Bari. "Törnqvist feels he will more easily gain access to the American factories as there, unlike in Europe, they are not suspicious of foreigners, as he speaks their language fluently and as the Americans prefer to employ a foreigner for the heaviest and most arduous tasks, whereby he can easily prepare himself for a position there", Robert wrote to Ludvig, continuing: "His decision to take any position that is offered will crown his enterprise with success and I now place his ability to master whatever he sees beyond all doubt." What it involved was, in other words, a sort of industrial espionage, thought not unlawful. Alfred covered the costs.

Törnqvist crossed the Atlantic in December 1878. In Pennsylvania, according to Robert, it would be good if he could "without mentioning our



Karl Wilhelm Hagelin, a key person in Branobel.

names, find out the most exact details regarding prices of drilling tools, all kinds of pipes, steam-boilers as well as necessary machines at the biggest & best manufacturing firms”. On Alfred’s advice Törnqvist also had with him samples of Baku oil which he had analysed in the USA. It turned out to possess quite different properties from the Pennsylvania oil, something that was important for the distillation process.

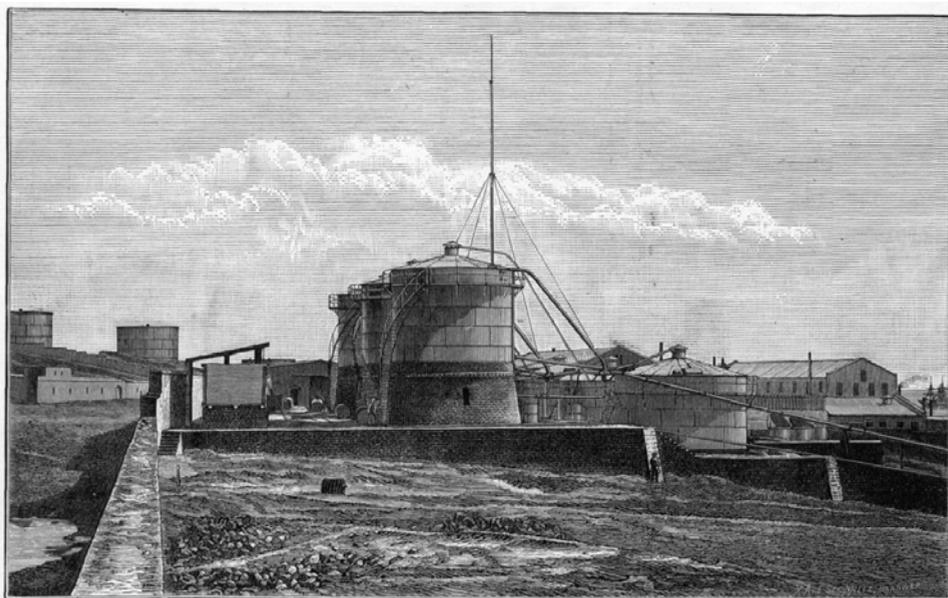
Before Törnqvist left the USA in the summer of 1879 he spent a month visiting the American patent office and at the Library of Congress, where he ploughed through everything that had been written on the subject



of petroleum. Törnqvist proved to be not only a technical genius but also someone equipped with significant moral qualities, which was impressive: “He goes about things in a sensible way, that man, and the expenses for his travels are so slight that one cannot help being amazed”, Robert noted. Törnqvist also learned Russian in record time.

Törnqvist’s first stop in Europe was, as before, Paris, where for about a week he was Alfred’s guest in his home on the Rue Malakoff. He had with him a couple of memorandums with detailed answers to the questions that the Nobel brothers had posed him during his stay in America. Alarik Liedbeck, who at this point was also working in Paris, also took part in the discussions, which among other things touched on the question of *continuous distillation*. This is a method that does not require the process to be halted for the addition of new raw material. The distillation apparatus is instead constantly fed with oil which in turn requires that the ready “fraction”, in this case paraffin, is constantly drawn off. The opposite process is called *batch distillation* – a time-consuming process in which, after the desired product has been collected, the vessel has to be cleaned and the process started again from scratch.

Alfred, Liedbeck and Törnqvist seem to have reached a fundamental solution to the problem during their discussions. When in September 1879 Törnqvist came to St. Petersburg he was sent by Ludvig almost immediately to Baku in order to make an experimental model for continuous distilla-



Branobel's purification tanks at the refinery in the Black City.

tion in the firm's mechanical workshop. After an initial test showed that the method worked the expansion of the factory was set in motion. Robert was so impressed by Törnqvist's ability that he recommended Emmanuel to make his acquaintance: "The young man (though now 25 years old) is by nature so richly equipped in all respects that he ought to become a veritable pillar on which a great weight of responsibility, in this business and yours too, can be placed. Should I die before he manages to assume his place, keep my words in mind, as a friendly piece of advice to you."

Work-related stress and the climate, however, took their toll, Törnqvist developed problems with his lungs and was forced to leave Baku. This meant a severe loss to the firm and Ludvig showered him with letters containing advice about doctors and health resorts. But Törnqvist recovered after some time in Western Europe and supervised and directed the work by correspondence from his convalescence on the French Riviera.

"The idea of the continuous motion has turned out to be excellent", Ludvig wrote to Alfred in November 1881: "The oil flows out of one boiler into the other, no pumping, cooling or interruption occurs." The method, which initially met with opposition on Robert's part, began to get into trim in the spring of 1882 and resulted in a major increase in the rate of production. In December 1882 Ludvig took out a patent on it, which was an unusual decision on his part. In contrast to his brother Alfred, for example, he maintained the fundamental belief that inventions ought not to be patented but should belong to all.

During 1883 the new plant produced 106 tons of paraffin, which was more than the other Baku factories put together. The new method meant that Branobel obtained a significant lead over their rivals; in Baku it would take fifteen years before continuous distillation began to be put into practice, in the USA, twenty-five.

After Törnqvist had recovered he went back to work for the Nobels, not in Baku but in St. Petersburg, where among other things he devoted himself to organising the export of lighting oil to Germany by trains and tanker boats. However, after a disagreement with the then local manager in Baku, the Finn Gustaf Törnudd, he left the firm in 1885 and moved to California, where the following year he died in a diving accident, only 32 years old.

"Very damaging for the Br. Nobel company, for we have never had such an intelligent, gifted and hard-working engineer in the company", was the comment on Törnqvist's departure by Karl Wilhelm Hagelin, the company's most important collaborator by a long chalk. Hagelin had been born in 1860 in St. Petersburg, where his father Wilhelm – who like Karl's mother was originally from the Norrköping area – was employed from



1859 to 1861 in Immanuel Nobel & Sons' mechanical workshop. The family lived in a little house built for the factory's workers which was situated so close to the workshop that "the house shook when the steam-hammer was operating". When the workshop went into liquidation the father obtained employment as a machine-operator in a British steamship company which plied on the Volga, and it was on boats and in towns along the river that Karl Wilhelm (known as Wilhelm) grew up. He learned Swedish from his mother, who could read but not write, and Russian in school. At the age of fifteen he started as an apprentice in a mechanical workshop and came to work for, among others, Kavkaz & Merkuri. In February 1879 he came to Baku, where he was immediately taken on at Gustaf Bengtsson's mechanical workshop.

There were already four Swedes working in the workshop – a smith, a turner, a filer and a lead-solderer and coppersmith – whom Bengtsson had recently recruited from Eriksberg's mechanical workshop in Gothenburg. But Hagelin only managed a few months' work there before he got a job as a filer with Robert, who on account of his sternness, according to Hagelin, was known as "Our Lord". The change of employer meant not only a higher wage but also became of decisive importance. "On the fourth day of Easter 4/16 April in the year of Grace 1879 there began my lengthy service in the Nobel petroleum company", Hagelin declared solemnly in his memoirs. Hagelin's service with Nobel would be not only lengthy but exceptionally successful, which will be a reason to return to him several times at a later date.

At Nobel's Hagelin was able to share living-quarters with Carl Qvarnström, a native of Värmland in west-central Sweden who was born in 1856 and who moved down to Baku from Gothenburg along with the other Swedes at Bengtsson's mechanical workshop. While the others had three-year-contracts with Bengtsson, Qvarnström, who paid the expenses of the trip himself, was free to leave the workshop when he wanted to. When Hagelin made his acquaintance Qvarnström had already gone to work for Robert and had become manager of the mechanical workshop where Hagelin found work as a filer.

During the eleven years that he worked for Nobel Brothers – in 1890 he started up his own lubricating-oil factory, "Bakunit", together with Martin Westvall – he would contribute to a series of important operational improvements. When he and Hagelin were taken on, however, Branobel had not yet been founded – that would take several months more. "The 'Nobel Brothers' Naphtha Production Company' was founded the same year, but when I came to the factory Robert Nobel was in charge of the whole thing, and also for some time after", Hagelin recalled, describing conditions there as follows:

The workplace was a little shed, where the “instrument workshop” and two stirrup-pumps were housed. There were three of us workers there: a Russian, Vesnenenko, who was the actual “toolmaker”, a Swedish former machinist and colleague of my father’s, Haglund, who with a little treadle-lathe turned naphtha-stand taps and myself, whose job was to finish off the taps in a vice. The actual workshop was in another part of the factory, but they did more rough work there, which was closer to “plumbing”. For at that time a refinery consisted mostly of walled-in boilers, bigger or smaller cisterns and a mass of piping.

ROBERT’S LAST DAYS IN BAKU

Robert was someone for whom hypochondria had over the years become part of his identity. At the same time he did have genuine health problems. There is not a letter in which he does not comment on his health and for the most part complain about how unwell he feels. He suffers from headaches, he has trouble with his spleen, his bowels, his liver – and with what he calls his “morbid mood” and “morbid irritability”. The typhoid fever he had suffered from in the spring of 1879 and that had so nearly finished him off made him think about leaving Baku, in particular as the new company had got off the ground.

In order for the company to be put “on a clear, lawful and official footing”, however, it had to be formally constituted. The inaugural meeting took place on 28th July 1879, after which Ludvig told Alfred that “our company is now officially organised and fully set up”. The agreement between Ludvig and Robert was also ready, even if it had been reached at the cost of trouble and dissension. It was “hard to be eternally pretending to be magnanimous and indulgent and to put up with everything, just because you keep telling yourself that the other person is unwell and that he should therefore be excused”, Ludvig complained to Alfred.

The depth of the antagonism is borne out by Robert’s definition of the settlement as “the great battle of the brothers”. The terms of the agreement were that Robert would, partly, receive a share in the company corresponding to 20 shares (*paj*) worth 100,000 roubles, and partly be compensated with 8,000 roubles annually for the work he had put in in Baku from 1873 up to 1st April 1881. This was money that Robert had Ludvig himself entirely to thank for. “I have every reason to hope that he will now be satisfied and feel happy, since he has been made secure and can see the work he has done bear fruit and give him self-esteem”, Ludvig wrote to Alfred, at the same time praising Robert for his contributions: “for I must say that the oil he produced is a real triumph for us and is gaining us a good reputation.”



Robert spent the summer and autumn of 1879 in St. Petersburg and returned to Baku in November, although he actually ought to have travelled to Europe for the sake of his health. But the pipeline had meant that the pace of production in the paraffin factory had increased, and moreover the demand from the market was growing the whole time. The factory therefore had to be expanded with several distillation boilers. It was in order to fulfil this task that Alfred Törnqvist was sent to Baku and it was in order to see the expanded factory completed that Robert stayed on in the city.

But it was not only practical concerns that made it hard for Robert to leave his post. He had built up the business and become accustomed to running the whole show himself and he was jealously suspicious of all attempted changes. After Robert's serious illness Ludvig was keen to find a successor for him so that he could leave Baku to "take care of and spare himself and get his strength back". But as Robert, according to Ludvig, had always surrounded himself with "lesser talents", there were no successors in Baku to choose from. The external candidates that Ludvig suggested were rejected by Robert. When in May-June 1880 Ludvig made a tour of inspection to Tsaritsyn and Baku the question of a successor became topical again, but Robert "is resisting ... and trying to frustrate all my efforts to find him a suitable *adjoint* (assistant)". It was not for nothing that Robert had the nickname "Our Lord"; Alfred even talked about his "self-deification".

Robert, as we saw earlier, was conscious that he was difficult to deal with. "Are you ones very sorry for me?" he asked his nephew Emanuel rhetorically. "Perhaps I make a fuss and *bänder*?? too much, but ... for 7 years now I have been wrapped up in this business to the exclusion of all else, so that I reckon I have grown together with it and every setback it encounters hurts me so deeply that it evokes from me bitterness that, to my own dismay, is sometimes aired on paper." The phraseology varied in a letter to Alfred that finished with the words: "I have therefore often wished for death – but it will not yet, it seems rob me of the joy of living."

Robert was in agony. The business in Baku was *his*, in the same way that the machine factory was Ludvig's and the dynamite empire Alfred's. At long last, by his own efforts, he had reached a position comparable to theirs. No wonder that he was suffering from a sense of loss that put his "morbid mood" severely to the test. The capital that was injected with the founding of the new company was necessary to realise the planned programme; Robert would never have been able to further develop his operation with his own resources alone. At the same time it must have hurt him that the company's successes were largely seen as the result of Ludvig's initiative and organisational ability.

In actual fact Robert played a significantly bigger role in the new thinking about the industry that is associated with Branobel than is usually ascribed to him. His contributions in the chemical field are acknowledged: had it not been for the successful work of extracting a cleaner paraffin the product would never have been competitive. Several of the innovations that tend to be credited to Ludvig, moreover, had Robert as their originator. Ludvig's document "Prospectus ..." and the essay in the Technical Society's series of journals drew on the book *Petrolia* which he got from Alfred as well as on his experiences on his visits to Baku in 1876. But the same suggestions about building cisterns, pipelines and transport ships that are presented there had already been put forward by Robert after his first visit to Baku 1873, long before Ludvig had started to take an interest in the question or even visited the city. The correspondence with the engineer Svenson shows that "ships for transports of paraffin without barrels", i.e. tankers, seem to have originally been Robert's idea.

The fact that Robert had been allotted a minor role in the setting-up of Branobel can be explained. In the first place the story was written after Robert's death by relatives of Ludvig's, partly in the form of two magnificent volumes published in connection with the Naphtha Company's 25th and 30th anniversaries respectively (in 1904 and 1909), partly by Ludvig's daughter Marta Nobel-Oleinikov in the book *Ludvig Nobel and his work* (1952). All later historians in principle rely on these sources. Even if in neither of these cases is there any question of a conscious belittling of Robert's contributions, there is no denying the element of special pleading in their portrayal.

The other factor that played a part in the verdict on Robert's contributions is undoubtedly his state of mind. The concept of a cantankerous troublemaker formed early as an overlay on the image of Robert and it has influenced posterity's view of him. "Already during his stay in St. Petersburg we knew for certain that if he had praised someone in the morning then he would dispatch him in flames to hell before sunset", Alfred explained to his nephew Emanuel – "It went like clockwork and never failed." But his brothers knew how to distinguish his ungovernable moods from his obvious talent and his major contributions in connection with building up the Naphtha Company. The passage where Alfred talks about Robert's "self-deification" ends with two rhetorical questions: "But is this not also something positive? Are fixed stars not nobler bodies than dull planets without any ability to shine by themselves?"

