Beautifully detailed iron gate from 1899. Advertising drawing from Kværner Works.

But the increasing demand for cast-iron trade goods – cast-iron goods produced in varying amounts for sale – was an important factor. For many foundries and mechanical workshops, the increased demand for cast-iron goods for numerous purposes laid the foundation for good earnings. And often this was a significant profit base, not merely for foundries dealing only in trade goods, but also for many mechanical workshops.

The shipbuilding industry was one such market. The time from the late 1840s to around 1880 is sometimes called "the golden era" of Norwegian sailing ships. In this period Norway's fleet increased from 284,000 to 1.5 million net registered tonnes.[18] The vast majority of the new tonnage was built in Norway, and furnaces, galleys, pumps, and a wealth of other equipment were needed for these ships. In this way the shipbuilding industry served as the foundation for many iron works. For example, it was no accident that many of the new iron foundries and workshops were established in the towns along the southern coast of Norway: Arendal, Grimstad, and Mandal. Arendal, which during this time grew to become the largest seafaring town in the country, had all of three iron foundries in this period. Mandal had two. Common to all of these companies was the fact that the shipbuilding industry was one of their most important markets.[19]

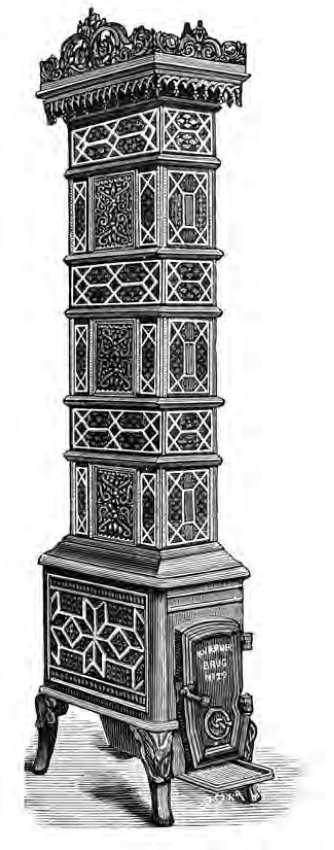
We find the same tendency in other parts of the country. In the 1850s a coterie of iron works sprang up in conjunction with the shipyards in and around Bergen. Naturally they varied widely in size and specialisation. Some were purely iron foundries, while others were relatively advanced mechanical workshops. But common to all of them was the fact that they produced great quantities of cast-iron goods for shipbuilders. Laksevaag Works was established primarily with this market in mind. Wingaard's Iron Foundry also had a large market in this field. And Bergen's Mechanical Workshop, which concentrated on construction of steamships and equipment for the timber-milling industry, also produced large quantities of cast-iron goods for the shipbuilding industry.[20]

Another market that was growing after 1840 was the construction industry. Increased urbanisation brought with it increased expansion of residences, businesses, and public buildings of various types. This activity also spurred greater demand for construction materials of cast iron, such as load-bearing beams, window frames, railings and banisters, fences, gates, etc.

Besides products for ships, woodstoves were undoubtedly the most important single product for the majority of iron foundries. And it may be that stoves were also the type of product on which the mechanical workshops mainly concentrated. Typical workshop operations such as Bergen's Mechanical Workshop, the Factory by Nidelven (Trondheim's Mechanical Workshop), Aadal's Works on Løten, and Mustad & Son were among those that had significant stove production.[21]

By way of introduction we indicated a number of factors that contributed to the growth in the market for cast-iron stoves in the years around 1850. For one thing, they provided convenience and simplified work. However, the most significant factor was probably the development in fuel prices.

Story furnace produced at Kværner Works in the 1880s. The furnace could be fired with coal, coke, and wood. The sales brochure stated that the furnace was "equipped with air-tight doors with valves so that combustion can be regulated precisely and great fuel savings can be achieved". The furnace weighed all of 278 kilos, and in 1884 it cost 102 kroner.



Starting around 1840, the price of wood in Norwegian towns began to climb sharply. There were several reasons for this. First, the international prices for lumber climbed in the years prior to 1850, which contributed to the harvesting of more wood for export. During the same period the domestic demand for lumber rose, which was primarily the result of a sharp increase in population. While the population of Norway in 1815 was about the same as it was fifty years earlier, during the thirty years from 1815 to 1845 it grew by a good 50 per cent. This meant that a great many new inhabitants needed building materials and firewood. And in conjunction with the growing urbanisation, new growth businesses were created that required considerable amounts of energy.

Cooking stove produced at Havstad Iron Foundry in Arendal, presumably in the 1850s. The stove was designed so that it could easily be placed inside the large fireplace of a kitchen.

The rising demand for multiple uses led to increased competition for timber and increased pressure on the forests. This was especially true in the most densely populated areas of the country. Commissioner Cappelen of Jarlsberg and Laurvig County (Vestfold) was one of those who expressed great concern as early as 1840 regarding the intense logging going on in the forests. The reason was, he wrote, "that the district in large part supplies its relatively large number of city dwellers with firewood, building timber, and shipping cargoes for export".[22] One result of these increased demands was that wood became more expensive. In 1845 Cappelen reported on a "sharp rise in wood prices" in the county.[23]

The rising fuel prices also raised concern in various scientific circles, including in technical forums such as the Polytechnic Union and the Polytechnic Journal. "The forests are diminishing and disappearing, and firewood increases in rarity and costliness", wrote Peter Christen Asbjørnsen in an article in the Polytechnic Journal in 1854.[24] Asbjørnsen was not only a well-known writer, but also a respected forester, and he was speaking here in his expert capacity. In the circle around the Polytechnic Union, to which Asbjørnsen belonged, there were many who were preoccupied with the fuel question. In the Polytechnic Journal the question was discussed in a number of articles both large and small. Most dealt with what today would be called energy economy – that is, measures which could contribute to improving utilisation of the fuel.[25]

In this regard there were two conditions that received particular attention. First, how residences were insulated, and second, what type of hearth was used. When it came to the hearths, the experts were in complete agreement on which were bad and which were good. As mentioned in an article in 1855, the open fireplace was a "very mediocre hearth".[26] Cast-iron stoves and brick stoves, on the other hand, were touted as the most efficient heating sources.

The enclosed stoves also had another big advantage in a time of rising firewood prices: They could be fired with imported coal and coke. These were energy sources which as early as the 1840s began to play a role in heating in Norway. If we turn again to Commissioner Cappelen of Jarlsberg and Laurvig, this time in 1855, we learn that "because of the sharp rise in wood prices, the use of coal is increasing more and more in some parts of the county".[27] But for such a conversion, enclosed stoves of cast iron were necessary. In other words, the changing price relationship between Norwegian and imported fuel, both directly and indirectly, contributed to promoting the transition to cast-iron stoves.

The Founders

The technical complexity varied greatly in the early iron and metal industry. Some businesses differed little from the traditional smithies and carpentry workshops, while others operated on a rather high technical plane. And between these extremes, there was a broad spectrum of companies with highly varied production. Nevertheless, the new iron and metal industry normally placed greater demands on both technical insight and other expertise than did other industrial operations. They were also more dependent on special types of technical knowledge. In light of these conditions it is interesting to ask: Who was behind the new iron and metal companies, and where did they obtain the technical knowledge? Were there certain common features amongst the entrepreneurs in the new industry? Or was it a group composed of men with diverse backgrounds?

The historian Lars Thue has investigated the industrial bourgeoisie in Christiania in the period from 1840 to 1875. He shows that amongst the founders of the mechanical workshops in the capital in this period there was a great over-representation of men with technical backgrounds. Above all there were different types of craftsmen. In addition, the somewhat indefinable group called "engineers" was strongly represented. This was a collective term for people with technical knowledge and covered both those who had a formal education and those who had acquired their know-how through practical experience. Men with a non-technical background, on the other hand, were only minimally represented.[28] Of course there were exceptions, such as Oluf Onsum, the founder of the Kværner Works. Onsum was a businessman and had no technical experience whatsoever.

Conical gear manufactured at Kværner Works. The photograph was taken in the late 19th century, when Kværner was in the process of focusing more heavily on machinery production.

In the iron and metal companies outside the capital we also find "engineers" taking the initiative. This was true, for example, of the creator of the first iron foundry and workshop in Bergen, Captain Georg Prahl. Prahl was a typical "technical enthusiast", strongly engaged in everything new on the technical front, and a source of all sorts of ideas.[29] In Kristiansand, the "engineer" Peder Lauritz Pedersen established in 1855 the Oddernæs mechanical workshop and foundry. This later became Kristiansand's Mechanical Workshop. Pedersen had his technical training from his father, who was a gunsmith. Before Pedersen started Oddernæs, he had also run a small smithy.[30]

Rasmus Brønlund had a similar background; in the early 1850s he established a mechanical workshop and foundry in Porsgrunn. Like Pedersen, Brønlund gained his technical training from his father, who was an instrument-maker. In 1862 the company was converted to Porsgrund Mechanical Workshop, which gradually became one of the largest workshop operations in Porsgrunn. Brønlund was also the impetus behind the establishment of Porsgrunn's first technical school. The school had its own foundry as well, which was a result of Brønlund's special interest in this field.[31]

Despite these examples, we must conclude that it was not the "engineers" who were the driving force behind many of the iron and metal works established in the early period. On the contrary, it was men with completely different backgrounds who were predominant. We have seen that Onsum, with his business background, represented an exception in Kristiania's industry. If, on the other hand, we look at the establishments outside the capital, he represented more the rule than the exception. Surprisingly enough, it was often men with backgrounds in trade and the service business ? who were leaders in the industry. And this did not apply merely to those who concentrated on production of cast-iron trade goods, but also to some of the mechanical workshops.

The examples are legion. In 1832 the merchant and farmer Hans Skikkelstad Brusveen founded factories in Gjøvik, which would later become the large Mustad & Son concern. Brusveen started as a factory manufacturing nails and iron wire, but quite soon a mechanical workshop and foundry were also built. Some of the most important products of the foundry were stoves, and after the company moved sections of its operations to Lysaker outside Kristiania, it became one of the country's largest producers of stoves.[32] Another company in the same field, the Aadal Works at Løten, was established by four merchants and farmers in 1843. Aadal began as a manufacturer of tools and machines for agriculture, but in 1847 also built a foundry to produce stoves and other cast-iron goods.

In Trondheim the merchants Christian Ludwig Schreiner, Herman Christian Garmann, and Arild Huitfeldt established the Trondheim Mechanical Workshop in 1843.[33] Wingaard's Iron Foundry in Bergen, which also became an important stove manufacturer, was established in 1850 by the merchant Oluf P. Wingaard. And the leading power behind Bergen's Mechanical Workshop, Michael Krohn, had a background in trade and finance.[34] Behind the Pusnes Iron Foundry in Arendal, later the Pusnes Mechanical Workshop, stood merchant and shipowner Gunder Berthelsen. Kragerø Iron Foundry was started by hardware dealer A. Andersen.[35]

Receiving at the Kværner Works foundry. The photo is from around 1900 and shows that transport was still done with muscle power. In the lower story a horse and cart can be seen. From there the goods were hoisted up manually with block and tackle.

The fact that businessmen were so important in taking the initiative was due primarily to three factors. First, they had knowledge of the market; second, they had access to capital; third, they had a wide range of contacts. As Åse Krogsrud writes about the founders of the Aadal Works on Løten: "As businessmen they always had their fingers on the pulse of market demand, and their involvement in industrial production doubtless sprang from that. As entrepreneurs, they preferred to organise the commercial side of the industrial operation. A wide network of contacts was their strength – they undertook purchases and sales and made deals to finance the projects."[36]

We must believe that these factors – market knowledge, capital, and contacts – were enormously important for a leader in the iron and metal industry. And presumably they were more important than technical know-how, which could be bought. In the many companies established by non-technical men, an engineer was usually hired to be responsible for the technical aspects of the company. And if he did not have the specific skills required, they had no qualms about sending him to other companies, in Norway or abroad, to acquire expertise.

The merchant bourgeoisie also played an important part in some of the companies in which engineers were the motive force. In many instances they were not alone, but were backed up by men

Foundry workers at Kværner Works in 1890. The 1880s were marked by many difficult conflicts between management and labour at Kværner Works. Things calmed down after the company got new owners in the 1890s.

with capital and market knowledge. Of course, characteristics such as technical insight, market knowledge, and access to capital could sometimes be found in the same individual. But it does not seem as though this was always the case. Perhaps it was no accident that Peder Lauritz Pedersen, who was indeed a talented engineer, struggled for so long to get the Oddernæs Mechanical Workshop in Kristiansand up and running. Pedersen's major problem was a lack of capital, and the company did not become fully operational until one of the biggest businessmen in town stepped in as one of the owners.[37]

There was thus a significant faction of men with business and other non-technical backgrounds in the early iron and metal industry. This was not particular to Norway, of course. The merchant bourgeoisie correspondingly played an important role in the establishment of the iron and metal industry in both Germany and Denmark.[38] The infusion of entrepreneurs with this type of background may also have been significant in other industrialised countries.

The critical factor: Expert skills

Hence, technical skills could be bought. Access to such skills, however, was long restricted here in Norway. In those days the country had no technical schools, except for the navy's main shipyard in Horten. Furthermore, the industrial sector was of utterly insignificant size, so that there was no comprehensive technical training of the workforce through practical experience. Of course, technical skills were not always the primary requirement. Some of the early mechanical workshops were not much different from artisan workshops, with simple manufacturing processes based on traditional tools. On the other hand, some workshops operated with quite complex production methods at an early stage, and they were totally dependent on people with thorough technical knowledge, which in many cases simply did not exist domestically.

The historian Kristine Bruland has demonstrated that a good number of the Norwegian mechanical workshops in the early phase built themselves up by importing technology and know-how from the foremost industrial countries of the day, primarily Great Britain.[39] This took place in three basic ways: through import of machines and other equipment (material transfer); through import of technical literature, plans, and the like (pattern transfer); and/or through import of technical and scientific skills (capacity transfer).

Bruland concentrates primarily on skills associated with production of machinery and other technical equipment. But what was the situation with technical foundry skills, the second main type of expertise on which the mechanical workshops and foundries were entirely dependent? Would they have to depend on skills transferred from abroad in this case as well?

Before we answer this question, we should take a closer look at what was involved in the casting process in the mid-19th century, and what skills it required.

Iron casting was a process that took place in three steps: the pattern work, mould-making, and casting. We might also add the finishing work as a fourth step in this process, somewhat dependent on what type of goods were being made. The pattern work was time-consuming and required great precision and woodworking skills. This work was therefore almost always performed by in-

house pattern carvers. The mould-making process was next. This consisted mainly of producing a sand mixture appropriate for the type of goods, along with preparation of patterns for casting. This was also a task that required great experience and skill. It was crucial to have a sand mixture that was good and adapted to the specific casting objects. It had to be porous enough for steam and off-gases to escape while the iron solidified, otherwise bubbles might form in the object. On the other hand, it had to be compact enough so that it would not collapse when the pattern was removed from the mould before casting.

The casting itself – operation of the blast furnace, pouring the iron into the moulds, etc. – was usually attended to by an in-house caster. Melting the iron was a complicated process. Critical factors in the melting process were the mixture ratio between raw material and fuel, furnace temperature, and selection of iron qualities for various purposes. In this case, however, there was not much exact knowledge on which to rely. There was no scientifically based metallurgy, and the caster had to rely on his own experience. In addition, one had to have special talents, a "feel" for the material, if you will. As the historian David Landes formulated it quite succinctly: "Iron manufacture was a kind of cookery – requiring a feel for the ingredients, an acute sense of proportion, an 'instinct' about the time the pot should be left on the stove."[40]

The work in the foundry, especially moulding and casting, thus made great demands on technical expertise. In addition, this was to a large extent "uncodifiable" knowledge, that is, knowledge that could not be acquired through studying books or by watching the work of others. Knowledge transfer therefore had to occur primarily by means of what we called "capacity transfer" above – by transfer from experts in the field. Where did the early iron and metal industry find these skills?

It may seem as though skilled foundrymen were a critical factor for many iron and metal companies. Presumably the conditions at Prahl's iron foundry in Bergen were quite typical. In 1845, two years after the foundry was put into operation, the city magistrate said this about the new company: "The iron foundry is still so new, and has had so many difficulties to combat during its early days, particularly considering that it has been difficult to find capable workers, at least in this city, that it is not yet possible to make any judgement as to whether it will be worthwhile...."[41] Other companies seemed to have similar problems. For example, in its first years, Aker's Workshop struggled to find capable trained foundrymen. As Hans Petter Lødrup writes, "In particular it was important to find moulders, but they were not easy to find in Norway, for Steenstrup [the manager] informs us that he wrote in vain to Stockholm for a moulder, and six months later they received an enquiry from a Danish moulder."[42]

So Aker's Mechanical Workshop had to look abroad to find skilled foundrymen. And not until 1846, five years after the workshop had opened, were they successful in convincing an iron caster to come over from Great Britain. A number of other new firms had to acquire such skills from abroad. In 1846 four sand-moulders were brought from abroad to Trondheim Mechanical Workshop. They probably came from Germany. One of them was later employed at Trolla Works as well.[43] Upon its establishment in 1855, Laxevaag Works brought in a German to fill the position of foundry-master.[44] At Wingaard's Iron Foundry it was French foundrymen who predominated.[45]

Representatives to the first national meeting of the Norwegian Moulders Union in August 1899. The union had been founded the year before. In the center of the second row the union's first chairman, Martin Nygaard, with characteristic moustache. Early on the moulders formed a very powerful and self-confident union of skilled workers.

But it was also possible to find skilled foundrymen domestically. As we saw, Prahl's Iron Foundry struggled to find skilled workers. This was solved when Henrik Meldahl was hired as manager in 1845. He was the son of Heinrich Meldahl, the former foundry-master at Nes Iron Works, and he had been trained at his father's workshop. In addition, he had spent several years at foundries in Newcastle, where he had "mastered the performance of every task involved in sand and clay moulding".[46]

Meldahl represented a link between the iron works environment and the new iron and metal industry. He was not the only one, however. If we look more closely at the places from which skilled foundrymen were recruited in the new iron foundries and workshops, it becomes apparent that many came from the old iron works. Jan Eivind Myhre has shown that the workshops in Kristiania recruited a number of skilled workers from the iron works.[47] Aadal Works on Løten did the same. When the company decided to build a foundry in 1846, the factory-master travelled to Bærum's Works to learn about running the cupola furnaces. At the same time he was looking to acquire "a competent work force – moulders, casters, and a skilled smith".[48] He returned home with four casters and moulders. To the south, along the Oslo Fjord, where the iron works were quite close to each other, recruiting from the iron works was most pronounced. Ulf Hamran has shown that a great deal of the work force at Kragerø Iron Foundry was recruited from the iron works along the south coast. In particular, many came from Nes Iron Works. Recruiting from there was so intense that Hamran speaks of "the emigration from Nes Iron Works". Many also come from Egeland's Iron Works to Kragerø Iron Foundry.[49] The Pusnes Foundry and Mechanical Workshop in Arendal also recruited skilled workers from Næs.[50]

It should be noted that skilled workers with an iron-works background were not merely important as a skilled work force – in a number of instances they were also creators of iron and metal companies. Drammen Iron Foundry and Mechanical Workshop, which became one of the country's largest quite early on, was founded by a former foreman at Eidsfos Iron Works – P. Blichfeldt.[51] Grimstad Iron Foundry and Mechanical Workshop was started by two men with a background from Nes Iron Works.[52] A former foundry-master at Ulefos Iron Works was behind the establishment of Havstad Iron Foundry in Arendal.[53] Men from Bolvik Iron Works were involved in the establishment of Porsgrunn Mechanical Workshop. And J. M. C. Fougner, who had previously been employed at Nes Works, was instrumental in setting up Frognerkilen Factory.[54] It is probable that the men taking the initiative sometimes also took other skilled workers from the iron works along with them to the new companies.

So there were clear relationships between the iron works and the new iron and metal industry. This fact has nevertheless often been overlooked. For instance, Gunnar Christie Wasberg and Arnljot Strømme Svendsen claim in their book about Norwegian industrial history that the old iron works meant little for the development of this industry. They write: "The modern Norwegian iron industry had to be created from the ground up. The connection with the old iron works, which so sadly went under, seems to have been negligible. At most we can assume a certain professional tradition in a few employees".[55] However, we must conclude that the iron works were much more significant than Wasberg and Svendsen claim. The flow of skilled workers from the iron works into the new iron and metal industry was considerable. In addition, these were skilled workers who played a greater role than their numbers would immediately indicate. They were the bearers of key expertise, and they took it with them into the new industry and passed it on there. Through practical training, this knowledge was then gradually institutionalised in the companies, and in this way it could eventually be reproduced internally.

Towards a stove-casting industry

As we have seen, for a long time it was difficult to draw a clear distinction between mechanical workshops and more dedicated foundries. Towards the end of the 19th century, however, a gradual specialisation occurred in the iron and metal industry. Many mechanical workshops began to cut back their production of trade goods. On the other hand, there were some foundries that started to direct their efforts towards individual specialities. True, most foundries continued to manufacture cast-iron goods for almost every conceivable purpose. The truly specialised foundries did not appear until around the First World War, and not until after the Second World War did most of the foundries turn to more restricted fields of production. But as early as the 1870s and 1880s, there were a number of foundries which began to focus more actively on specific main products at the same time as they continued to manufacture a diverse range of products. And the area that most often stood out in such a context was stoves.

Base burners from Aadal's Works in Løten, 1880s or 1890s.
To the left an elegant base burner for the parlours of the bourgeoisie, clearly inspired by the neo-Renaissance. To the right a richly decorated model designed as a pillar on a high pedestal.

Production of stoves was undoubtedly the closest one came to mass production in the early iron and metal industry. As a rule the manufacturers offered a number of standard models, and production was based only to a small extent on commissions. Standardisation thus made it possible to produce mass quantities of specific types, such as during periods when capacity in the foundry was poorly utilised. What was not sold immediately could be stored until later.

At first the markets and the communications situation placed restrictions on how much could actually be produced. Production was long directed towards a limited local market. To be sure, individual iron and metal companies did break through these limitations early on, although with other products. The historian Olav Wicken relates that Brusveen Nail and Steel Wire Factory in Gjøvik, the predecessor of Mustad & Son, had a considerable market for nails as early as the 1840s, especially in western Norway.[56] The exploitation of such markets was undertaken by peddlers who travelled about and made contacts with merchants in the towns and country districts.

Heavy stoves, however, were much more difficult and expensive to transport long distances overland because of the road conditions of the day. Transport problems did indeed play a large role for a company such as Brusveen as well. But it is no accident that this inland factory was also late to take up the production of stoves. This occurred only after the company established itself with a foundry in Lysaker outside Kristiania. In the same way we see that the Aadal Works on Løten was among the first to sell lighter iron goods over great parts of the country, but did not take up stove production until the Hamar district was linked to the capital by railroad in the 1860s.[57]

Cylinder stove from Kværner Works, model from 1880s or 1890s. The stove was almost 1.7 metres tall.

Individual iron foundries began to make inroads quite early in some more distant markets. This occurred in several ways. First, commission agents were used who travelled around and took orders for stoves from retailers in the larger towns. Second, more permanent relationships with individual large retailers in the towns were established. The main factor was that sales of larger quantities made it worthwhile to send heavy goods over longer distances by sea.

The next step in the market expansion was to establish one's own sales outlets in other towns, which is what some of the larger foundries did after 1860. Aadal Works, for one, established a permanent outlet for its cast-iron goods in Lillehammer and Solør in 1862. Three years later Aadal also set up its own outlet in Christiania. Ulefos Iron Works and Bærum's Works, which both continued as iron foundries after their iron works operations were closed down, also eventually established their own outlets in the capital. Kragerø Iron Foundry and Drammen's Iron Foundry and Mechanical Workshop did the same.

For some time during the final decades of the 19th century, it became more common for the foundries to associate themselves with exclusive retailers in the towns and larger country districts, where the market base was not large enough for them to set up their own outlets. These retailers received very favourable discounts, credit and the like, in return for not carrying products from any other foundries. This practise resulted because the foundries were now beginning to operate over larger areas of the country. This meant that there were often long distances between retailer and supplier, as well as long delivery times, so that efficient turnover required the retailer to carry a sizeable inventory. This prompted demands for closer ties between producer and retailer. In addition,

Kokesovn No. 11.
(Entreovn).

Fodens Diameter . 0,410 Millimeter.
Ovnens Høide. . . 0,940 »

Kr. 18,—.

Kokesovn No. 42.
(Entreovn. — Magasin).

Diameter . . . . 0,335 Millimeter.
Høide. . . . . 0,995 »
Bevægelige Rister.
Sleben . . . . . **Kr. 55,—.**
Usleben . . . . . » **50,—.**

Kokesovn No. 39.

Diameter . . . . 0,330 Millimeter.
Høide. . . . . 0,655 »
Sleben med drejede Ringe **Kr. 16,—.**
Usleben uden » » » **12,—.**

Kokesovn No. 45. (Magasin).

Fodens Diameter . 0,390 Millimeter.
Ovnens do. . 0,234 »
do. Høide . . . 1,045 »
Bevægelige Rister.
Sleben . . . . . **Kr. 36,—.**
Usleben . . . . . » **32,—.**

Coke stoves in various designs, as they were presented in an advertising brochure from 1894. Towards the end of the 19th century, imported coke had taken over a large portion of home heating in the cities. In the villages, wood still dominated.

it was important for the retailers to have good knowledge of the supplier's stoves and be able to instruct their customers on their use, how spare parts could be ordered, and so forth. This again prompted greater follow-up and attention from the retailer, who in turn demanded that the supplier grant certain special concessions.

The growing competition resulted in retailers gradually assuming a strong position with regard to manufacturers. Retailers began playing manufacturers off against each other with the intention of obtaining additional favourable concessions. In this way the competition grew ever more intense, and during periods of slack demand the manufacturers would go to great lengths to meet the retailers' demands. Towards the end of the 19th century it was not unusual to operate with discounts of 30 to 40 per cent on heating and cooking stoves to the retailers.[58]

Towards the end of the 19th century, the growing market for stoves led to the development of a group of foundries which specialised in this type of production, and which sold their products in larger parts of the country. In the 1880s the term "stove foundries" was used for the first time, and in the 1890s a group of foundries had emerged which specialised in this area. Some were independent foundries, some were large workshop operations which had organised stove casting into their own divisions.

In 1899, ten of the largest stove foundries joined to form the National Association of Stove Foundries [Ovnstøperienes Landsforening]. This was the first professional group to be founded within the National Association of Mechanical Workshops [Mekaniske verksteders landsforbund]. The desire of the stove foundries for an association was primarily prompted by a wish to be able to regulate competition. Alf Bang relates how the development towards larger markets made this necessary: "Dispersed as they are in our vast country, they [the foundries] first found their important market in the surrounding country districts and nearby towns, but as communications developed, greater and greater competition arose amongst the individual foundries all over the country, and this sparked the desire for a certain degree of regulated co-operation".[59]

Indeed, it took quite a long time before the stove foundries managed to create lasting unity on rules that regulated competition in the stove market. This did not happen until around 1930. However, the association early became an important meeting-place and a useful forum for discussion for the players in the field; at times it was also an important lobbying organisation with various authorities.[60] This was a role it retained until after the Second World War. Not until new heating methods began to displace cast-iron stoves as the most important heating source in Norwegian homes after World War II did the trade association begin to lose its significance. Under pressure from new energy sources, in the 1950s and early 1960s most of the stove foundries went out of business or switched to other types of production. One of the traditional stove foundries, however, succeeded in expanding rapidly in the post-war period by converting to new markets and products, namely Jøtul. This book tells the story of that company.

Nå tok det riktignok lang tid før ovnstøperiene klarte å skape varig enighet om bestemmelser som regulerte konkurransen i ildstedmarkedet. Det skjedde ikke før omkring 1930. Imidlertid ble foreningen tidlig en viktig møteplass og et nyttig diskusjonsforum for bransjens aktører, og den betydde i perioder også en del som lobbyorgan overfor ulike myndigheter.[60] Det var en rolle den beholdt helt til etter andre verdenskrig. Først da nye oppvarmingsformer begynte å fortrenge støpejernsildsteder som den viktigste oppvarmingskilde i norske hjem etter andre verdenskrig begynte bransjeforeningen å miste sin berettigelse. Under presset fra nye energikilder bukket etter hvert de aller fleste ovnstøperiene under eller la om til annen produksjon. Et av dem greide imidlertid gjennom omstilling til nye markeder og produkter å ekspandere kraftig i etterkrigstiden, nemlig Jøtul. Det er denne bedriften denne boken handler om.