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FAGERSTABRUKENS HISTORIA 1957—1959

A PICTURE OF THE SWEDISH IRON AND STEEL INDUSTRY

During the 1920s the steelworks of Fagersta, Forsbacka, Horndal and Österby, with traditions reaching back to the great expansion of the Swedish iron industry in the 17th century, or even further, combined with Stjernsund and Kloster, famous in the history of manufacturing, to form the great Fagersta Concern, *Fagersta Bruks Aktiebolag*. The combination was a salvage-operation after the inflation of the First World War and the deflation of the early 1920s. Professor Ernst Söderlund has told the story of how this operation took place. Not only the iron-works concerned but also the bank which was most involved have unreservedly made their records available. This has made it possible for Professor Söderlund to present a contribution that throws new light on important problems in Sweden's latest economic history.

When the Concern was consolidated, Hjalmar Åselius, managing director from 1942 and since the mid-1930s one of the leaders of the reorganization, commissioned Söderlund to prepare a plan for a history of the Concern and its constituent iron-works. The commission was a complicated one. Each of the works had a fascinating history but before the Concern was formed they had had very little in common.

The source material for the history of the Swedish iron industry is abundant: the enormous records of the central administration from the time of the mercantilist planned economy and the often well-preserved records in the private archives of the iron-works. Those who have treated the general history of the industry, have usually been compelled to confine themselves to the material in the central archives though this

has implied that they have not been able to enrich their research by the close contact with everyday work and business management afforded by the local records. Since in this case the records of several works representative of various aspects were to be examined, Söderlund suggested that an attempt should be made to obtain the synthesis by using the results of this research for a reinterpretation of the general history. The interest in purely local history could be satisfied by taking examples mainly from records of the works belonging to the Concern, and by verifying the general presentation and giving body to it in monographic chapters on the individual works. The local material dominates, of course, Dr. P. E. Wretblad's account of the technical development within the Concern and also in the volume which deals with the history of iron-workers, charcoal-burners and other wage-earners within the industry from the early 17th century, a presentation laudably free from both patriarchal romanticism and anachronistic welfare-state ideology. A well-known author, Örnulf Tigerstedt, has had at his disposal a whole volume in which to relate episodes illustrating high-days and workdays, the unique cultural *milieux* and the destinies of men and women at the iron-works now belonging to the Concern.

The main exposition is the work of three professors of economic history: Karl-Gustaf Hildebrand, Artur Attman, and Ernst Söderlund. Previous research in the history of the iron industry has chiefly concerned the 17th and 18th centuries. Hildebrand, whose volume covers this period, has enriched the discussion by original contributions and demonstrated how the local

records give concreteness to the problems. Attmans task was to give a preliminary synthesis of the much less well-known history of the industry during the 19th century. By revealing and firmly presenting the quantitative data he has laid the foundation for all further research. Söderlund has given a lucid epitome of a development which lies so near that clouds of facts dimmed a clear perspective.

The accounts preserved in the local archives have afforded valuable information on many problems, e. g. costs of production, wages and financing. Here only some of the main lines of development can be discussed.

The increase in the price of charcoal, which resulted from the scarcity of forested areas in western Europe, gave greater possibilities for iron export to those iron-producing countries that were richly forested — Sweden first and then Russia. For Sweden the new opportunities were actualized by the wars during the first half of the 17th century which increased demand whilst partly paralyzing production. The structure of the Swedish industry did not permit of seizing this opportunity simply by an expansion of existing production. Many of the important iron-ore deposits in Central Sweden had been worked for centuries, in most cases by *bergsmän* (peasants who combined mining and iron-making with farming) and on a very small scale. When suddenly it became of importance to supply foreign markets with wrought iron, up to date works were built in which the *bergsmän*'s pig-iron was refined and hammered into bar-iron. As a short-term solution of the problem this was effective. Exports increased from 6 650 metric tons in 1620 to a good 17 000 tons in 1650 and some 30 000 tons at the turn of the century. But a great number of works remained restricted to obtaining their pig-iron from the *bergsmän* and thus the small scale pig-iron production of the Middle Ages was preserved long past the time when it had become technically outdated. Uneven pig-iron of unreliable quality was a serious problem later on when it became necessary to raise the quality of Swedish bar-iron.

An integration permitting the bar-iron works to produce their own pig-iron would have been the natural solution both technically and economically. But this solution was considered permissible only if such integration did not encroach on the resources needed by the *bergsmän* who supplied those works with pig-iron which were

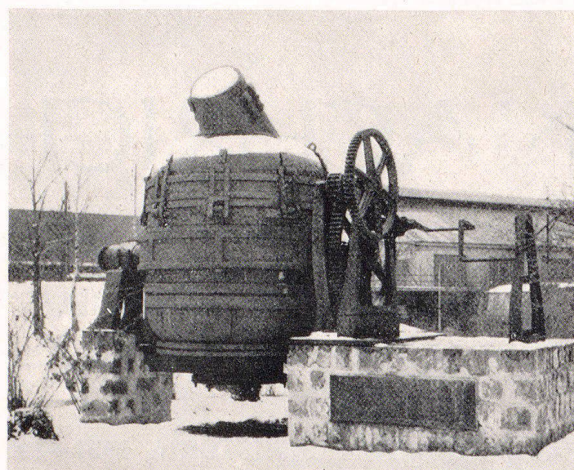


Illustration of one of the first Bessemer units
Now in the Technical Museum at Stockholm

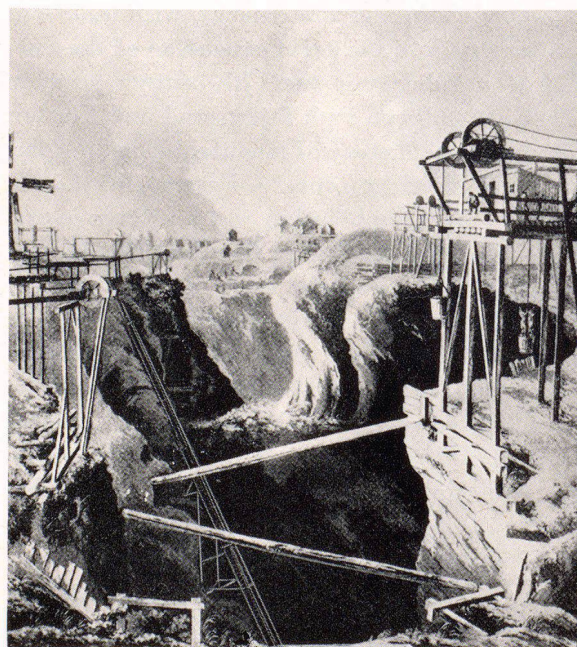


Illustration of the famous iron mine at Dannemora

situated for from the mines or where for other reasons no iron could be smelted. Nevertheless the output of pig-iron at integrated works became considerable; in the 18th century some 50 per cent of the total output was produced at such works. At the famous Dannemora Mine, which produced Sweden's highest quality iron ore, no medieval organization caused interference. The works in the region of this mine were thus from the outset fully integrated; their operations included mining and smelting as well as the production of bar-iron.

It was the low price of the means of production — ore, charcoal, water-power, and labour — that gave the Swedish iron industry its chance to conquer foreign markets, and the doctrine was tenaciously adhered to that the power to compete could be maintained only if costs of production could be kept at a low level. If increased costs were allowed to drive up the price of Swedish iron, then foreign producers would once again be in a position to compete with the Swedish iron-masters. The conclusions drawn from this resulted in the introduction of a general systematic rationing of the basic means of production, and logically this principle led to endeavours to impose a rational limitation of the output at each works. The original intention of the authorities was to ensure a maximum total output but after the depression of the 1730s and 1740s the system was usurped in order to prevent an expansion of output (1747). For the strict economic liberalism it appeared unwarrantable for Sweden to limit its output when the demand for iron was on the increase but Hildebrand strongly stresses the fact that Sweden had no such monopoly as would enable her to dictate prices; Russia at once moved in. — The limitation of bar-iron output is one of the subjects which have been much discussed in Swedish historical literature. If what Sweden was able to produce from her resources is compared to the rapidly increasing demand, it becomes quite evident, however, that the solution only came with the advent of puddling, since this method gave a means whereby cheap fuel could be substituted for expensive and scarce charcoal.

How Swedish wrought iron managed to survive competition with puddled iron is a far more important question than that of limitation of output. In the beginning of the 18th century Swedish iron faced a severe crisis. The revolutionary wars were the immediate cause but the crisis was extended and exacerbated because Swedish iron had become unnecessary for a number of its earlier uses. Influential forces were at work for Sweden to adapt the puddling process to charcoal and go in for mass production, but costly experiments failed to achieve the desired result. Another solution of the problem was preferred. Where high-quality iron was needed, puddled iron could not be substituted for charcoal iron. In the Swedish industry efforts were therefore consciously directed to the production of high-grades. The decisive advances of these efforts were achieved

through a new method, the Lancashire process, an adaptation of British charcoal fining methods introduced in the mid 19th century. Demand for high-grade iron grew with the general increase in iron consumption, and though this demand was successively confined to a decreasing number of uses, it supported an export which was many times larger than that of the pre-puddling era. The Lancashire process gave Swedish wrought-iron production a final period of greatness which, almost paradoxically, extended long into the epoch of ingot steel.

The idea that Swedish production should be confined chiefly to high-quality charcoal iron lost its justification when the price of charcoal was driven sky-high by the competition for timber from the paper pulp industry and other causes, and when the import of coal on a large scale became possible. When liberalism had made a clean sweep of the rationing of the means of production and other regulations, production was concentrated to fewer and larger works. The *bergmän's* furnaces and the many small ironworks were swept away. Thus, in 1844, there were 510 ironworks producing wrought iron; in 1913 37 of a total of less than 75 produced 90 per cent of all Swedish iron and steel. Furthermore, a new large domestic market had arisen for ordinary grades. When the main demand had been for bar iron the ironworks had concentrated their efforts on the manufacture of this semi-finished product, a choice undoubtedly warranted by strong economic reasons; 'patriotic' attempts to ensure further manufacturing had met with little success, even though more was achieved than has hitherto been presumed. But during the 19th century an engineering industry was created which in the 20th century became one of the most expanding of all Swedish industries. The 'high-grade ideology' caused the fact that this industry worked largely with foreign iron to be regarded with equanimity.

One of the main themes of Söderlund's presentation, apart from the analysis of the economic development, is the account of how the Swedish iron industry was affected by the changed preconditions mentioned above. The production of high-grade iron, mainly for export, was still successfully pursued, but the output of these grades was not sufficient for the capacity of the large new works. They had to capture, and capture they did, at least a substantial part of the domestic market for ordinary grades. The fol-

lowing figures speak for themselves. Towards the close of the 18th century about 50 000 tons of wrought iron were exported of a total output of some 55 000 to 60 000 tons; in 1913 the output of steel and wrought iron was 1 150 000 tons; in 1955 over 2 000 000 tons. The 50 000 tons were a major part of European output of wrought iron; the 2 000 000 tons did not comprise even 1 per cent of world production of ingot steel. This shows how limited Sweden's resources are in relation to modern needs — but *Fagerstabru-*

kens Historia also emphasizes that these resources are being used intensively. Bertil Boëthius

Fagerstabrukens Historia 1—5, Uppsala, 1957—1959

1. *Hildebrand*, Karl-Gustaf
Sexton- och sjuttonhundratalet. XII, 488 S.
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Arbetare och arbetarförhållanden. XIV, 643 S.

NEUE BÜCHER ZUR GESCHICHTE DES EISENS

ERNST SCHRÖDER, DIE WALDER GUSSSTAHLERFINDUNGSGESELLSCHAFT (TRADITION, ZEITSCHRIFT FÜR FIRMENGESCHICHTE UND UNTERNEHMERBIOGRAPHIE 1959, HEFT 3, S. 149 BIS 173, HEFT 4, S. 223—241).

Mit Recht wird die Erfindung des Tiegelgusstahles durch den Engländer Benjamin Huntsman als eine der Grundlagen der industriellen Revolution betrachtet. Während die Engländer die Erfindung als Geheimnis ängstlich hüteten, war man auf dem Kontinent mit ebenso grossem Eifer bestrebt, den Schleier zu lüften, der das Herstellungsverfahren des technisch so wichtigen Werkzeugstahles verhüllte. Es ist bekannt, dass dem Schaffhauser Johann Conrad Fischer als erstem auf dem Kontinent die Fabrikation des Tiegelgusstahles gelungen ist. Ernst Schröder weist im vorliegenden Aufsatz auf das Problem der Nacherfindung des Huntsmanstahles hin und bietet eine eingehende Schilderung eines im Rahmen dieser Bemühungen besonders eigenartigen Falles, der Erfindertätigkeit der Walder Gussstahlerfindungsgesellschaft.

Nach jahrelangen Versuchen gelang der im Kirchspiel Wald im Amte Solingen gegründeten «Chemischen Gesellschaft» die Erschmelzung eines Stahles, der dem englischen an Qualität nahekam. Durch ein Dekret Napoleons vom 26. Februar 1813 wurde das «Walderverfahren» patentiert. Mit dem Gesuch um Patentierung war die bisher gewährte Anonymität aufgegeben worden; Andreas Küller und seine drei Brüder liessen das Patent auf ihren Namen ausstellen. Im selben Jahre erfolgte die Gründung der Firma «Walder Gussstahlgesellschaft», die aus 18 Gesellschaftern bestand.

Das kleine Unternehmen litt von Anfang an unter finanziellen Schwierigkeiten. Die Ueberflutung des Kontinents mit englischen Waren nach der Aufhebung der Kontinentalsperre verschärfte die Notlage, und nur noch die Hoffnung auf staatliche Unterstützung schien einen Ausweg zu ermöglichen. Das Urteil der Berliner Behörden über die Qualität des fabrizierten Stahles war durchaus aner kennenswert, und die grundsätzliche Bereitschaft zur Subventionierung wurde ausgesprochen. Trotzdem verfangen sich alle Realisierungsversuche im Netz der Bürokratie. Nach jahrelangem Zögern erfolgte 1823 die endgültige Absage von Seite der Behörde. Die Folge war der Zusammenbruch einer Arbeitsgemeinschaft von Erfindern, deren Leistung durchaus Achtung eingeflösst hatte.

Im Anhang druckt der Verfasser seine Hauptquelle ab, die von einem ihrer Mitglieder, Gottlieb Fries, verfasste Darstellung des Schicksals der «Erfindungsgesellschaft»; es handelt sich dabei um einen Ausschnitt aus der Familienchronik von hoher Anschaulichkeit. Zum Jahre 1811 bemerkte Fries ganz schlicht: «Auch etablierte ein gewisser Krupp in Essen an der Ruhr eine Gussstahlfabrik und verwandte hierauf grosse Summen. Sein Produkt kam zwar dem unsrigen an Güte nicht gleich, indessen wurde doch auch hierdurch zu unserem Nachteil Konkurrenz vermehrt.»

Karl Schib