

Guide through the Kopparbergs bergslags aktiebolags exhibition at Paris 190...

Stora Kopparbergs bergslags aktiebolag

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GUIDE

through

THE STORA KOPPARBERGS BERGSLAGS AKTIEBOLAG'S

EXHIBITION

at PARIS

1900.

For prices and particulars please apply to:

MESSRS. FRIEDLÄNDER, GUTZEIT & Cie

17 rue de Surène, PARIS

the Company's agents in France.





The Company's foundation year about anno 1225.

The Company began to make

Copper	about the year	1225
Sawn timber goods	in the year	1689
Iron	» » »	1735
Gold and Silver	» » »	1790
Steel	» » »	1871
Paper pulp	» » »	1895
Paper	» » »	1900



Historical Notes.

STORA KOPPARBERGS BERGSLAGS AKTIEBOLAG is the oldest stock company in Scandinavia and one of the oldest in the world. The company's foundation year cannot be exactly determined, but its history can be followed far back into the early part of the middle age.

There is yet in existence an original purchase deed, **dated in the year 1288**,* about the sale of stock in the company, and the charters of the company, given by king Magnus of Sweden and Norway, are dated **the 24th of February 1347*** and are confirmed by later Swedish kings in the years 1366, 1413, 1442 etc., according to yet existing original parchment documents. The charters however are — properly speaking — a codification of the company's rights and privileges, granted by king Magnus' predecessors and already at that time (1347) mentioned as very old.

On account of certain new investigations historians suppose that the origin of the company is to be placed between the years 1200 and 1250. According to that the foundation year generally is said to be

about anno 1225.

The domains of the company, valued at about 40,000,000 kronor, are mainly situated in the province of Dalecarlia and consist chiefly of vast **forests**, rich **iron** and **copper mines**, and large **waterfalls** amounting to more than 150,000 Horsepower; on these natural resources are three principal trades founded, viz. Wood, Iron & Steel, and Copper.

1. The Wood Department.

This department of the Company's business, has not been carried on to the present considerable extent more than a few decades. The raw materials are mostly obtained from the company's own forests, which have an area of 850,000 acres or about 3,500 square

* A carefully made copy of this document is exhibited.

kilometres and are spread out around the rivers and lakes in Dalecarlia, which form water-courses of 2,700 kilometres in length (about 1,700 English miles) by the building of guiding dams and excavations etc. with immense expenses adapted to the floating of timber from the forests to the saw mills. The logs are during the winter dragged on the snow to the tributary rivers, float out in the spring to the Dala River, the artery of the province, and on this river to the Baltic, where the Company's **Saw Mills Skutskär** are located. At these works, the largest of its kind in the world, the logs are cut into deals, boards, floorings etc. The annual output is about 50,000 St. Pet. stds sawn and planed goods of wellknown brands.

In Skutskär a new branch of the company's wood business was founded in 1894 by building a **PULP MILL** for turning out unbleached **sulphate pulp** and after several extensions the capacity of this mill has been gradually raised and is now 15,000 tons per annum of air-dry Sulphate pulp of high, easily bleaching quality. Besides a **SULPHITE PULP MILL** is in course of construction and expected ready to begin operations before end of this year (1900). The calculated yearly output is 15,000 tons of air-dry fibre by the Mitscherlich process.

A further development of this new line of the company's wood industry is imminent, and a **PAPER MILL** for manufacturing some suitable forests into paper is built at an important waterfall of about 16,000 HP in the Dala River some 4 kilometres above the Domnarfvet Iron & Steel Works. The new plant — **Domnarfvet Paper Works** — consists of a ground wood pulp factory and a paper mill, both equipped with the most modern machinery and planned for a production of 100 tons of paper in 24 hours. The works are expected to start about June 1900 and will, at least to begin with, be entirely confined to the manufacture of news in reels and sheets. All machinery except the paper machines themselves will be run electrically.

The present wood products are:

PLANKS, DEALS, BATTENS and BOARDS.

PLANED BOARDS, FLOORINGS and JOINERY GOODS.

MOULDINGS, STAVES and BROOMHANDLES.

FIREWOOD and FINISHED BOX MATERIAL.

SULPHATE WOOD PULP.

CHARCOALS made in STACKS.

CHARCOALS made in KILNS with bye-products of:

TAR, ACETATE of LIME and METHYL ALCOHOL;

and to this within short time will be added:

SULPHITE WOOD PULP.

GROUND WOOD PULP and

PAPER.

Almost the whole production is exported.

2. Iron and Steel Department.

In the year 1735 the company built its first iron work, **SVARTNÄS**, based on the then discovered Iron mines at Vintjärn; one iron work after the other was later on added, each intended for its own particular speciality so that the company has manufactured Iron at some 20 places in all.

So many difficulties met, however, in economically carrying on the manufacture at so many places on account of the expensive communications existing, that it was decided about 1870 to concentrate the iron manufacture and for that purpose build new works, for which place was selected at one of the big waterfalls of Dala River. This new works is **Domnarfvet**, which is the largest Iron works in Scandinavia and the largest in the world based on **Charcoal** as fuel. To it belong 200 iron mines and a number of water falls together capable of developing about 50,000 Horsepower, of which however only a small part at present is utilized. The works consists of following departments:

CHARCOAL MAKING PLANT with 8 large kilns and extensive chemical factories for recovering bye-products (tar, acetate of lime, wood alcohol.)

BLAST FURNACE DEPARTMENT with 5 charcoal blast furnaces, 6 Westmans roasting kilns, Cowper heating stoves etc. A mould foundry for direct casting from blast furnace and a slag brick pressing plant are connected with this department. Large quantities of slag bricks are also cast directly from blast furnaces.

BESSEMER STEEL PLANT for direct swedish process.

SIEMENS-MARTIN or OPEN HEARTH STEEL DEPARTMENT containing 4 furnaces of 15 tons each.

ROLLING MILL PLANT for Sheet iron, steel Plates, Tube steel, Projectile steel, Wire rods, Nail rods, Channels, Angels and all kinds of high quality bar iron.

STEEL FOUNDRY and ANVIL MANUFACTURING SHOPS.

FORGE FOR HAMMERED TOOL STEEL and MISCELLANEOUS TOOLS.

FORGE FOR HAMMERED IRON BARS. Special make for the oriental and levantie market.

PLATE PRESSING WORKS for boiler heads and similar articles.

HORSE SHOE NAIL FACTORY. Hot forging method.

BOLT and NUT FACTORY.

SHAFT TURNING FACTORY.

The principal manufactures at Domnarfvet are:

PIG IRON, extra pure: Phosphorus 0,016—0,020, Sulphur trace — 0,010 %.

INGOTS, BLOOMS, BILLETS and SLABS of Bessemer and Siemens-Martin steel;

BILLETS, specially made for **SEAMLESS COLD DRAWN TUBES**;

PROJECTILE STEEL in large quantities for the English and other armies and navies:

ROLLED BARS in various shapes and **NAIL RODS, WIRE RODS, RIVET RODS** of Bessemer and Siemens-Martin steel and Swedish Lancashire iron;

HAMMERED BARS of Swedish Lancashire Iron;

BOILER AND SHIP PLATES;
 SHEET IRON, corrugated and smooth; Also extra thin for electric machines.
 PRESSED AND FLANGED WORK of plate;
 MACHINE TURNED SHAFTING, Brightmans method.
 HAMMERED STEEL (Miners drill Steel, Tool Steel, Shear steel, Spring steel, File steel,
 Pin steel, Machine Steel, File blanks etc.)
 STONE CUTTING TOOLS, hammers, picks etc.
 STEEL CASTINGS especially ANVILS.
 HORSE SHOE NAILS. BOLTS and NUTS.

The products from Domnarfvet are to a large extent exported to the great countries of Europe, to America, to Australia, to East Indies, China and Japan.

The company furthermore owns two other works, **KORSÅ** and **ÅG**, where especially SOFT SWEDISH CHARCOAL WROUGHT IRON is made.

The annual production of Iron and Steel is:

55,000	tons of Pig iron
35,000	» » Bessemer ingots
26,000	» » Siemens-Martin ingots
4,000	» » charcoal iron blooms
50,000	» » rolled and hammered iron and steel of all kinds.
1,000	» » Horse shoe nails, Bolts and Nuts etc.

For the works are yearly used 450,000 cubic metres of charcoal (of these are 150,000 cub. metres made in the kilns at Domnarfvet and Skutskär).

3. Copper Department.

The Company's original business was the manufacture of Copper from ore obtained at the world renowned Copper mine at Falun, »Stora Kopparberget» (The great copper mountain) from which the Company's name is derived. The said mine is also the Company's oldest property and has been continually worked for nearly 700 years and has during this time yielded, according to lately made researches in the old account books, about 500,000 tons of copper, 15,5 tons of silver, and 1,2 tons of gold, the whole representing a value of 1,000,000,000 kronor (£55,555,555); only one or two other copper mines in the world have to show such an immense production; King Gustavus Adolphus the Great gave to the mine the honorary name of »The Country's Treasury».

The ore in the mine consists of copper pyrite together with sulphur pyrite and quartzite, which also is the surrounding rock.

From the withering of the sulphur pyrites is formed a substance, which by burning is converted into a Red mineral paint everywhere used around the country in Sweden for painting and preserving the houses, that mostly are of wood, and this painting is so common that it really has given a characteristic aspect to the Swedish country.

The mine at Falun is 1200 feet (360 metres) deep and its underground galleries and excavations have a length of about 30 kilometres (18 engl. miles).

The yearly output of copper reached in the middle of the 17th century up to 3,067 tons, a quantity very nearly equal to the world's total consumption at that time.

The products at the Falun Copperworks are

REFINED COPPER.

GOLD and SILVER.

SULPHATE OF COPPER.

SULPHATE OF IRON.

SULPHURIC ACID.

RED MINERAL PAINT.

SELENIUM DUST.

The present yield from this mine is yearly:

400	tons of	Copper		
1,600	»	»	Sulphate of	copper
300	»	»	»	» iron
3,000	»	»	Sulphuric	acid
1,000	»	»	Red mineral	paint
400	kilograms of	Silver.		
100	»	»	Gold.	

1. The Iron and Steel Department's Exhibition.

The Company's exhibition forms the entrance arch to the Swedish section of Gr. XI.

N. B. All exhibited iron and steel are made of CHARCOAL PIG IRON from the Company's own blast furnaces.

IRON ORES from the Company's mines JOHANNISBERG, BURÄNGSBERG, BISPBERG and STRIPA.

Analyses:

	Johannisberg	Burängsberg	Bispberg	Stripa
Sesquioxide of iron.....	64.42	76.66	89.64	45.76
Peroxide of iron	—	0.03	4.48	25.09
Protoxide of iron.....	6.13	—	—	—
Protoxide of manganese	6.88	0.48	0.14	0.31
Magnesia	4.72	3.94	0.78	2.21
Lime.....	1.62	2.38	0.60	3.19
Alumina.....	trace	0.82	0.32	0.43
Silicic acid	1.30	16.58	4.46	21.70
Carbonic acid	13.60	—	—	0.20
Iron	51.41	55.33	68.05	52.00
Phosphorus	0.002	0.005	0.003	0.008
Sulphur	0.03	0.025	0.003	0.003

CHARCOAL, made in kilns from round wood, which in lengths of 10 feet is floated from the forests to the steelworks.

CHARCOAL, made in kilns of waste wood from the saw mills.

As the wood is free from bark and during the floating for a long time subject to a washing process the resulting charcoal holds very little ash (0.2—0.25 %) and consequently only traces of Phosphorus and Sulphur (about 0.003—0.006 % of each metalloid).

INGOTS of BESSEMER STEEL of different tempers. Shown in fracture.

General analysis: Phosphorus 0.016 %, Sulphur 0.005 %.

FRACTURE OF MILD STEEL, showing the extra ordinary toughness of this material.

Analysis: Carbon 0,05 %, Silicium 0.007 %, Manganese 0.19 %, Phosphorus 0.008 %, Sulphur 0.005 %.

FRACTURE OF SWEDISH CHARCOAL WROUGHT IRON BLOOM..

SOLID BLOOMS for makers of rolled and afterwards cold drawn weldless tubes of high quality, (for boilers, bicycle frames etc.) Made as speciality. To show what kind of tubing is to be made of these blooms, a few samples of cold drawn bicycle tubes are exhibited.

WIRE RODS in coils rolled from extra soft charcoal iron (Swedish Lancashire process) and from extra soft steel (open hearth and Bessemer process).

NAIL RODS in coils and bundles made from extra soft and fibrous iron and steel.

NAIL PLATES in coils for cold cut horse shoe nails.

RIVET RODS and RIVET BARS.

SOFT SWEDISH CHARCOAL WROUGHT IRON, hammered and rolled.

in 3"× $\frac{5}{8}$ " single bars,

in long and short bundles,

in oriental shapes for easier transporting.

A large quantity of this iron — in size of 3"× $\frac{5}{8}$ " — is exported to Sheffield, where it is converted to blister steel in cementation furnaces. This steel is specially used for springs.

Large quantities are also sold to the Levant, the Orient and South America. In that case the iron is generally packed in long bundles, but when destined to places far away in the interior of the country, the iron must, as shown by the exhibited samples, be packed in small bundles or bent into loops, spirals etc., in which shapes the iron easier can be carried long distances, — perhaps thousands of miles. — on the back of animals like camels, yaks, elephants etc.

WELDING SAMPLES. The following samples are exhibited to show the well known welding properties, which are characteristic to swedish material.

Two pieces of steel welded together and afterwards drawn in testing machine.

The sample shows that the weld is stronger than the steel bar itself.

Two pieces of steel welded together. Afterwards a hole is punched through the weld seam and enlarged by increasing mandrels. The seam shows no sign of opening or bursting.

Two pieces of steel welded together. The sample is afterwards bent cold over the weld.

CROSS SECTIONS of a number of mild and hard steel bars welded together. The samples are afterwards etched to show the difference in percentage of carbon.

HORSE SHOE NAILS. It is well known that nearly all horse shoe nails in the world are made of Swedish charcoal iron and steel. The reason is that no other iron making country puts on the market a material as soft and tough as the Swedish and every nail manufacturer knows that for this purpose only the very best is good enough. The Company, which exports large quantities of nail rods to foreign countries, also makes and exports finished horse shoe nails, manufactured by the hot forging method, which is considered the best in every respect. The nails from our factory are made most carefully, are well pointed and closely inspected. As is shown in the Company's illustrated catalogue about 250 different models and sizes are manufactured. Ice nails and snow nails, ox shoe nails and donkey nails also are made.

SERIES OF HORSE SHOE NAILS showing the models, which are used in Sweden, England, Ireland, Danemark, Italy, France, Spain, Holland, Rumania, Ungaria, Java, North America and South America.

COLD DEFORMED HORSE SHOE NAILS, bent, twisted etc. in different ways to show the toughness of material.

RIVETS. All kinds of rivets for boiler makers, bridge builders etc. made of special soft, plastic and sound material.

COLD TESTED RIVETS. Bent together. Flattened and folded. Holed by increasing mandrels.

RIVETS COMPRESSED BY HAMMER. Original length = twice the diameter. Length now = $\frac{1}{3}$ of original length.

HOT TESTED RIVETS. Holing by increasing mandrels during cooling from yellow heat to dark red heat.

SECTIONS OF RIVET JOINTS, where the rivets were pressed into holes of intentionally different sizes as per the following scheme:



BOLTS AND NUTS of every description.

COLD TESTED BOLTS. The wormed part cold bent. Thread and head flattened.

BOLTS, drawn in testing machine with head and nut fixed in the grips. The samples show that head and worm is stronger than the bolt itself.

NUTS, cold pressed together sidewise.

NUTS, the hole cold enlarged by mandrels. Interior diameter now = exterior diameter before enlarging. Besides are nuts showing the original shape.

SHEET IRON of 0,3 millimetres thickness. Special make **for electric machines.** Two samples of such sheet iron from the Company's steel works tested by the Swedish Governments testing office at Stockholm show the **Hysterisis Constant 0.0010** as per certificate.

GOBLETS. The goblet and its cover are each pressed of one single piece of sheet iron, made at the Company's steelworks.

DRINKING HORN, 1300 millimetres long, pressed of one single disk of sheet iron from Stora Kopparbergs Bergslags Aktiebolag's Steelworks at Domnarfvet. The disk before pressing 802 millimetres in dia. and 1,09 millimetres thick. — The horn was afterwards etched by B. Beskow.

SIEMENS-MARTIN STEEL CASTINGS. Only a few samples are shown, the exposition space not allowing many or large pieces to be exhibited.

FINISHED ANVILS entirely cast.

GEARS, ROPE PULLEYS, STEAMER SCREWS ETC., partly cold deformed by hammer. All this pieces are cast of basic open hearth steel.

WIRE RODS, rolled of high grade steel of tool steel quality for makers of extra strong wire ropes, piano wire, spiral springs etc.

PIANO CORDS, drawn of that kind of steel rods, which is exhibited.

PROJECTILE STEEL. The Company makes this steel as a speciality in large quantities and supplies some of the most important gun and projectile factories in Europe with this material.

SHAFTS, turned and straightened. Brightman's method and machinery.

HAMMERED TOOL STEEL, made from the very best and purest swedish rawmaterials. MINERS DRILL STEEL AND ROCK DRILLS, hammered.

FRACTURES OF TOOL STEEL, of different tempers, not hardened. Only pure carbon steel (no Chrome or Wolfram).

COMPRESSION SAMPLE OF TOOL STEEL, carb. 1.20 %, to prove the soundness of the steel. (Original length = 3 times the diameter. Length after the compression = $\frac{1}{4}$ of the original length.)

SABRE, Swedish army's officer's model, made of steel from the Company's Steel works at Domnarfvet.

SABRE, Swedish navy's officer's model, made of steel from the Company's Steel works at Domnarfvet.

RAZORS, made by K. Törnblom at Eskilstuna of high grade special razor steel from the Company's Steel works at Domnarfvet.

COLLECTION OF SURGICAL INSTRUMENTS, manufactured by A. Stille at Stockholm of instrument steel made and supplied by the Company from the Steelworks at Domnarfvet.

TURNING TOOL. As per certificate 833 kg. shavings of hard pig iron have been turned off with this tool after the last sharpening. — The tool is still usable without new sharpening.

TURNING TOOL. As per certificate 970 kg shavings of Siemens-Martin Steel (carbon 0,40 %) have been turned off with this tool after the last sharpening. The tool is still usable without new sharpening.

SPIRAL BORE. After the last sharpening 4,28 metres have been bored into hard pig iron with this bore, which is still usable without new sharpening.

CHARCOAL WROUGHT IRON, $3" \times \frac{5}{8}"$ bars, hammered. Special make for export to Sheffield, where the bars are converted into Blister steel for spring manufacturing or further melted to crucible steel.

BLISTER STEEL, made at Sheffield of Charcoal iron bars, furnished by our Company. One piece double shear steel showing original faggot, and one piece blister steel showing the correct temper for crucible steel.

COACH SPRINGS, manufactured at Sheffield from rolled Blister steel, made of iron bars from the Company's ironworks.

2. The Wood Department's exhibition.

Visitors will find some of the Company's wood products exhibited in two different groups, viz.:

Gr. IX, where the Company takes part in the Swedish forest owners collective exhibition.

CHARCOAL made in kilns of waste wood from the Company's saw mills,

CHARCOAL, made in kilns from floated wood. The Company owns ten large charring kilns constructed according to new patented design. Production 150,000 cubic metres charcoal yearly. The rawmaterial mostly consists of waste wood (tops and branches, internally rotten timbers etc.) which is collected in the Company's forests after the log cutting. The smoke from the kilns is exhausted by fans and carried in wooden pipes to the extensive factories, where the following also exhibited bye-products are recovered:

WOOD TAR, separated and filtered. Free from water. Made in two qualities; light and dark.

ACETARE OF LIME and

WOOD NAPHTA (methyl alcohol), purified.

From the Company's cellulose factory at Skutskär is exhibited:

PULP-WOOD, cut ready for putting into digesters.

WET READY BOILED PULP, taken directly from the digesters.

FINISHED SODA PULP, unbleached. Air-dry containing 10 % of moisture.

and **Gr. XIV**, where the Company takes part in the Scandinavian paper-pulp makers Collective exhibition.

Here is only exhibited:

SODA-PULP or SULPHATE CELLULOSE in sheets.



