M^r le Cte Lamoïsky

1879 - 1880

SIDNEY and MELBOURNE

INTERNATIONAL EXHIBITIONS

BELGIAN INDUSTRY

IN AUSTRALIA

10,000 COPIES

FOR FREE DISTRIBUTION IN AUSTRALIA

BRUSSELS

PRINTED BY A. LEFÈVRE, RUE DU PILOTE, 9

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TE OUR READERS

"Belgian industry and art in Australia," is a work intended, in the first place, to secure for Belgian produce a new and productive outlet in Australia, and in the second place, to secure for Australian capital a new and also most productive investment in Belgium.

We feel confident this twofold object will be attained by a careful review of the present condition of Belgium as a manufacturing country. The remarks and returns which will be found in the ensuing chapters concerning the country's mineral, metallurgical, agricultural and other natural resources, its general organisation, its industrious character, its wonderful means of communication with every part of the world, and the advantage at which it stands with regard to other producing countries, on account of its low rates of labor, will enlighten Australian importers as to the little suspected profits they will realize by sending for many of their supplies to a country which, of late years, has got ahead of its most powerful neighbours in at

least five or six different branches of industry.

Such a work as this will therefore do good service to the Australian colonies at large as well as to Belgium. As the Australian population grow and as their institutions improve, their taste and cultivation are making rapid strides while their wants are increasing in an extraordinary measure. At such a juncture, did not private as well as public income augment in proportion to the additional expenditure caused through increasing wants, it would be as difficult for Australia as for any other country, to avert the financial disturbances which must necessarily ensue.

Now, the surest system for making the two ends meet and avoiding such a collapse is to reduce one's expenditure at the lowest possible figure, on the principle that "money saved is money earned" and this anybody can do, without denying himself any of the requisites, comforts or even luxuries of life, if he will only take the pains of inquiring who can meet his wants at the most reasonable price.

There is no doubt, when studying the question from a broad and national point of view that Belgium, as a manufacturing centre, can supply many of Australia 's wants at a much more moderate cost than could any other Continental State. This is particularly true as regards glass, clothing material, metallurgical produce, mechanical appliances, chemical articles, etc. for the production of which Belgium has a special calling and possesses means few other communities can boast of.

Nor would the advantage accruing to Australian trade from transactions with Belgium be a merely pecuniary one. Quality, in our case, is not second to cheapness and as concerns the above-mentioned articles our Belgian produce are not only less expensive but better than others.

For, Belgium is above all a manufacturing country where the number of people who cultivate art or literature is exceedingly small when compared to the immense number who receive technical education and devote their lives to professions connected with building, mining and manufacturing. The result is that manufacturing processes are much more complete and perfect and workmanship more skilful, while native competition being exceptionally large, the manufacturing production of the country attains a very much higher level than elsewhere, both as regards cheapness and quality.

Every bit of information supplied by this book — and all of it is genuine and official — will corroborate our assertions and we firmly believe that after a careful perusal of our remarks, Australian importers will avail themselves of the opportunity which we lay before them of increasing their profits and extending their trade by applying to Belgium for articles they have hitherto been in the habit of seeking in other parts of the world.

In order to make the task easier for them, our work contains a list of the principal firms exercising the different branches of industry that

are most likely to meet Australian requirements, and as such a list can be of no value, unless thoroughly impartial, we have excluded from it all minor houses that do not deserve special recommendation. There are also a great many branches of industry and some very important establishments we have refrained from mentioning, either because their produce are not such as can compare with similar Australian articles, or because of the difficulties attending the carriage of such produce, or again because of their utter useleness in far distant regions.

As to the time we have selected for issuing such a publication, we may add that none seemed to us more appropriate than the occasion of the Sydney Exhibition, because, many of the firms mentioned in these pages being contributors to the grat show in New South Wales, it will be easy for any native importer to satisfy himself as to the accuracy of our statements concerning them, by a glance at their exhibits.

INTRODUCTION

After living for centuries under Spanish, French, Dutch and other foreign domination, the Belgian people finally recovered their freedom and national independence in the year 1831.

A wise and intelligent Prince was vested with the royal power, eminent men were entrusted with the government and an era of prosperity and calm then began.

The Belgians, however, in entering upon a fresh life, had to prepare themselves for it. The task was no light one, yet it was very attractive, for it gave the people an opportunity of displaying their particular genius and of showing what they were capable of doing, when left entirely to themselves.

Until the day their independence was proclaimed, the Belgians had been working for masters who invariably stripped them of all the fruit of their labor and lavished it upon their own countrymen, so that whatever they conceived or achieved was utterly lost to themselves. But immediately after they had shaken off foreign yoke and proclaimed Prince Leopold as their king, their trade and industry brightened up and

when in 1833, the government ordered railroads to be constructed, there was an outburst of national activity such as had never been witnessed anywhere.

This can be easily explained : the Dutch having cut off the water communications which until then had connected the Rhine with the river « Escaut, » the Belgian Government were bound to establish some other means of swift and cheap communication, in order to promote the influx of German goods into Belgian ports. There was only one way of carrying ont such an object and this was to create railroad communication. Belgian statesmen did not shrink from an undertaking which no other Continental power had yet been bold enough even to entertain ; they ordered railroads to be constructed throughout the land and thus set the world the unprecedented example of the smallest State on the Continent being the first to bring into operation the most wonderful scheme set forth in modern times.

The construction of railroads naturally gave birth to many building establishments and the foundation of these made it necessary to open and work the country's mines and extend every branch of industry and trade connected with the original railway scheme, while the richness of the soil in building materials, gave a sudden and strong impulse to civil and military engineering.

As might have been expected one of the immediate consequences of the kind of " business epidemic " which had taken hold of the country, was the starting of a great many financial establishments, so that when the promoters of trade and industry made a call for funds, money literally came forward in heaps to assist enterprise and insure the success of public undertakings.

So fully did capital trust to labor and so fully did labor trust in itself, that no scheme, of whatever magnitude, was found impracticable or looked upon as a folly; capital came to the front for whatever purpose and whatever purpose was contemplated was carried out.

The enormous amount of money that was launched into circulation brought wealth and security with it and not many years had elapsed before pauperism became an almost meaningless word within the blessed dominions of King Leopold the First.

At the present day, after half a century's freedom, peace and constant labor, Belgium has become one of the wealthiest countries in the world and its agricultural, commercial, scientific and financial institutions have lifted it to the front rank among Continental States.

Nothing could better illustrate this state of things than what occured last year at the Paris Exhibition.

In the Exhibition buildings, only two countries — Great Britain and France — occupied more room than Belgium. A plot of ground equal to the tenth part of the Palace of the Champ de Mars and measuring 13,475 square yards was allotted to Belgian exhibits which therefore covered more space than those of Austria, Russia, Italy, Spain, the United States, Switzerland, the Netherlands or Sweden and Norwegia; indeed, when Belgian exhibits had to be put in their places, it was found necessary te trespass on the ground set apart for Denmark, Greece and Morocco.

In the main avenue of the Exhibition where every nation had been requested to erect a monument in its particular style, visitors from all parts of the world halted admiringly before the Belgian monument which was officially acknowledged to be the most beautiful

of all- an opinion that is strikingly confirmed by the fact that it is the only one that has been and is to be permanently kept standing in Paris.

In the section of public instruction, a diploma of honor was awarded to the king of the Belgians himself, as the President and founder of the International Association for the exploration of Central Africa, while the number of awards conferred upon his majesty's subjects startled many people unacquainted with the wonderful progress the country had achieved within a few years.

In the agricultural section, no fewer than 8 out of 15 Belgian exhibitors carried prizes. In the horticultural department, 20 out of 40 obtained awards, including 2 great prizes and 4 gold medals. In the exhibition was held a cattle show; 35 out of 37 Belgian breeders were rewarded, one of them with the highest prize and 7 others with gold medals, while 26 out of the 35 Belgian exhibitors who took part in the horses-how received like acknowledgments.

In the Public Education department, Belgian exhibitors carried one great prize, 34 gold, 22 silver and 11 bronze medals, together with 31 honorable mentions which brought up the total number of prizes to 94.

As we further proceed, we find the Belgian firms that exhibited linen fabrics to have been 49 in number; 12 of them carried great prizes and the remainder gold medals. This is a branch of production in which Belgium particularly excels. The same may be said of the cloth and woollen stuffs' department where 52 out of the 54 Belgian exhibitors were presented with the highest awards.

We must, however, give up going on with the list of victories achieved by Belgium at the late Paris

Exhibition, lest in should carry us too far. Suffice it to say that out of 1215 Belgian exhibitors in the industrial sections, 992 (giving a ratio of 82 per cent) were found deserving of a high reward, while in the agricultural department the ratio was 70 per cent.

Such overwhelming success had never been heard of. And, indeed one must admit it was well calculated to confound foreigners, when one reflects at the immense efforts that must have been made to acquire perfection in so many different branches within the limits of a small country extending over no more than 11202 square miles and inhabited by merely five million and a half souls.

To make the fact comprehensible, it will be necessary for us, before proceeding further, to supply our readers with some information regarding Belgium's resources and general stock (1). We will begin by a statement of the country's

Landed and wooded Estates.

In 1876, the area of land under cultivation was 5,199,687 acres; the woodlands covered 1.288.832 acres and rivers, rivulets, etc. 34,685 acres. The railroads, highways and canals extended over 181,575 acres; buildings and houses occupied 88,000 acres and there were only 392,650 acres of uncultivated land.

According to official returns for 1876, an acre of land in Belgium fetched 75 pounds, 6 sh. and 7 d. The

(1) The figures and statements that follow are gathered from the annual returns published by the Belgian Home Office, from Mr Wareg Massalski's remarkable " Essay on Belgium's material wealth " and from other creditable sources.

5.199.687 acres of land under cultivation therefore represented in 1876, at the rate of 75 p. 6 s. 7 d. per

	Pounds sterling
acre a sum a little over	391.688.088
To which must be added 1.288.832 acres of woodland, at 16 pounds per acre . .	20.621.312
And 392,650 acres out of cultivation, at 16 shillings per acre	314.120
So that the total value of land in Belgium is	412.623.520

Vegetal produce.

In 1876 cultivated lands were farmed out at about 2.64 per cent of their saleable value, in other words, at 1 pound, 1 s. 10 d. per acre. So that the land worth altogether 412.623.520 pounds was leased out for 10.876.000 pounds sterling. The average value of the crop amounted to 3 pounds, 15 s. 5 d. per acre, representing therefore about thrice and a half more money than was paid for the rent. It follows from this that Belgian crops yield on an average 37.742.496 pounds sterling per annum.

Cattle.

Colts from 1 to 3 yeards old. — In 1876, there were in Belgium 54,876 colts worth on an average 16 pounds, 12 shillings and 10 pence a piece or together a little over 913.186 pounds sterling.

Horses, three year-olds and upwards. — In the same year, there were in the country 234,136 horses averaging in price 25 pounds, 10 shillings and 5 pence a piece or aggregately about 5.975.150 pounds.

Horned cattle from 1 to 3 years old. — There were

also 472.416 head of horned cattle worth 6 pounds, 8 shillings and twopence halfpenny a piece-altogether about 3.004.566 pounds.

Horned cattle, from three year olds upwards. — This section comprised 754.825 head worth 13 pounds, 8 shillings and 5 pence a piece-altogether 10.507.164 pounds.

Sheep. — Belgium furthermore owned 580.833 sheep at one pound, ten shillings, and five pence a piece-altogether 882,866 pounds.

Pigs. — Again there were in Belgium 806,184 pigs worth one pound 3 shillings and 5 pence a piece-altogether rather more than 951,297 pounds.

So that if we add up these different sums we find that Belgium's property in live cattle amounted in 1876 to :

	Pounds sterling
Colts	913,186
Horses.	5,975,150
Horned cattle (from 1 year old) . . .	3,004,566
Ditto (» 3 » ») . . .	10,507,164
Sheep.	882,866
Pigs	951,297
Total . .	22,234,229

To the foregoing must also be added the value of domestic animals (pigeons, hens, ducks, geese, rabbits, etc.,) which, when taken into account, will bring up the above figure to at least 24 million pounds sterling.

Real Estate.

The value of private residences must be computed according to household taxation. The public revenue from household taxation amounted in 1876 to 2,595 920

pounds sterling. However, when it is remembered that taxes paid are invariably twice and a half lower than chargeable property is really worth, it will be found that if fraud were not practised the net household revenue would-reach 6.489.800 pounds and as household taxation is charged at the rate of 5 per cent on the value of property, we will not be far from the mark in valuing the aggregate worth of Belgian real estate at 140.000.000 pounds, including the scores of small houses that are completely exempted from tax rates.

PUBLIC BUILDINGS, CHURCHES, ETC.

In 1876, there were 78,361 buildings of the kind.

To ascribe an average value to these would be a difficult thing. Still let us rate them at 2000 pounds a piece, although such a figure must be much below what it should be, if we judge from the fact that the 120 churches under the State's supervision are set down at an aggregate price of 7.400.000 pounds, one of them alone — the church of *Nôtre-Dame* at Antwerp — being worth 720,000, while the new Court of Justice which is being built in Brussels will have cost, by itself, nearly two million and a half sterling.

In taking therefore 2000 pounds as the average value of the 78,361 public buildings erected in Belgium, we arrive at the total figure of 156.722.000 pounds.

FURNITURE, PICTURES, CLOTHING, ETC.

The property we have now te deal with must be classified under two different heads : Property belonging to inhabited residences and property belonging to uninhabited buildings.

With regard to the former, there are in the various

Belgian constituencies 117,143 persons enjoying the right of voting; the poorest of these at least possess about 100 pounds worth of furniture or other goods; the wealthiest — and many of them are very wealthy — have thousands of pounds' worth of works of art, articles of luxury and other property. Assuming that the average property of each elector represents 800 pounds, we arrive at a total sum of 93.714.400 l. which, when added to about 6 million, representing the aggregate value of property belonging to the remainder of the population, reaches very nearly a hundred million pounds.

We now come to similar property attached to public buildings or uninhabited residences which, as we have already stated are 78,361 in number. It is hardly possible to fix the exact value of the articles employed for furnishing such buildings as museums, guildhalls, courts of Justice, public offices, factories, schools and so forth. We will, therefore, ascribe to each, at the risk of underrating most of them, an average value of 800 pounds, which, when multiplied by 78,361 gives a

	Pound sterling.
figure of	62,688,800
besides the amount of property attached to private residences	100,000,000
Total.	162,688,800

Mines and quarries.

We find in Mess[rs] Jochams et Witmeurs' interesting *Statistical tables relating to mining and siderurgical industries in Belgium, for* 1875, the necessary material for an accurate statement of Belgium 's wealth in mines and quarries. We will first refer to the

Value of Belgian collieries. — According to official returns, the average produce of Belgian collieries during the last ten years has yielded annually 7,600,000 pounds sterling, the net profit on which has been 940,000 pounds per annum. If we assume that such profit represents 8 per cent of coal mine property — which at least it does — we will find that Belgian collieries are worth, as a whole, 12,650,000 pounds sterling.

Quarries metallic mines and small ores. — Although the work that supplies us with our information does not mention the net profits cleared in this branch, we may get at them through the following table of the value of annual production.

	Pounds sterling.
Quarries	1,683,301
Metallic mines	232,786
Minor ores	137,325
Total.	2,053,412

Now, rating the profits ou quarries and mines' production in the same proportion as profits ou collieries' produce, the net profit of the former amounts to 252.315 pounds per annum, which representing 8 per cent of the actual property sets the value of this

	Pounds sterling
at.	3.153.947
Sum up with the foregoing	12.650.000
and you find the total figure of	15.803.947

as representing the aggregate value of collieries quarries, mines and small ores throughout the country.

And let it be borne in mind we do not include the value of interest on rolling stock which will appear further on, either as part of the country's stock in trade, or in some other paragraph.

Stock in trade.

Of the 117,143 electors of which we spoke in the paragraph relating to furniture, those in business may be classified as follows.

Manufacturers.	3,727
Contractors	3,894
Jewellers, etc.	697
Printers and booksellers	598
Shopkeepers.	8,949
Merchants	8.133
Total.	25,998

If we ascribe to each of these persons a stock in trade worth 400 pounds, we find the total value of Belgian stock to be 10,399,200 pounds sterling which we can safely bring up to 12 million, when we take into account the stock in trade of business people not enjoying the right of suffrage.

We have not included in our figure the millers, bakers, farmers, brewers, etc... whose stock in trade appeared in our second paragraph, as part of the value of the country's vegetal produce.

Gold and silver.

A valuable work on the monetary question (1) published in 1876 by Mr Malou, then Belgian Minister of Finance, values at 1.750.800.584 l. st. the amount of gold and silver in circulation at the time among the Western nations of Europe.

This bulk of money equally divided between the 131 million (2) persons living in Western Europe (England,

(1) *Documents relatifs à la question monétaire*, by J. Malou.

(2) The figure is borrowed from Mr Maurice Block's *Annuaire d'économie politique et de statistique pour* 1875.

France, Belgium, the Netherlands, Portugal, Denmark, Germany, Switzerland, Sweden and Norwegia) shows the metallic stock to be distributed at the rate of 13 l. 7 s. and 2 d. halpenny per person. So that Belgium's metallic wealth reaches the sum of 64.649.040 l. st.

Railroads highroads parochial roads and canals.

We include in the following statement the value of the buildings and objects of art attached to railroads, etc.

Railroads. — In 1876, the extent of railroads worked by foreign companies was 916 miles, 6 furlongs and 43 yards; while the Governement's railroad lines extended over 1257 miles, 5 furlongs and 58 yards.

The Government's railroads including working stock, stations and general expenses, had cost 24,741 l. 18 s. 4 d. per mile, but assuming that the average cost of the Governement's and private companies' railways was 22,526 l. per mile, the aggregate value of Belgian railways will be found to reach in round numbers 48.985.000 l. st.

Highroads. — In 1875, there were 5003 miles of roadway whose average cost may be set down at 2227 l. 18 s.

This figure is based on the following data:

During the period extending from 1840 to 1850, the average price of a mile was 1201 l. 7 s. 2 d. A roadway a mile long and 11 yards wide occupies a plot of ground which at that time was worth 161 l. 8 s. If we add to this 1244 l. 8 s. — the cost for constructing a mile roadway — we find that in 1846, the intermediate year between 1841 and 1850, the price of a mile road was 1405 l. 6 s.

During the period extending from 1851 to 1860, the average cost of a mile road was 1646 l. 10 s. so that from 1846 to 1856 the value of roadways increased by 240 l. 14 s. During the period of twenty years extending from 1856 to 1876, the increase has been over twice as large, say 581 l. 8 s. which added to 1646 l. 10 s. representing the cost of a mile road in 1856, brings up the present price of a roadway to say 2227 l. 18 s. per mile.

The 5003 miles of Belgian roadways therefore constitute a property worth 11.145.173 l. 14 s.

Parochial roads. — In 1850, the extent of parochial roads in Belgium was 5853 miles. From 1841 to 1850, the authorities had constructed 946 miles of broad and 3015 miles of narrow road. The former cost 348,320 l. st. and the latter 687,600 l. st. so that the average price of broadroads was 368 l. per mile and that of narrow roads 228 l.

Besides this the Budget votes for parochial roadways from 1850 to 1870 were as follows.

From 1851 to 1855	480,000 l.
From 1856 to 1860	520,000 l.
From 1861 to 1870	1.400,000 l.

the total expenditure therefore amounting to 2,400,000 l. for twenty years or 120,000 l. per annum.

From 1850 to 1865 the budget votes for parochial roads were as follows :

In 1852	10,050 l.
In 1855	87,017 l.
In 1859	126.211 l.
In 1865	185,233 l.
Giving a total expenditure of. . .	408,511 l.

for fifteen years, or 27.234 l. per annum. The average

yearly outlay for constructing parochial roads is therefore 147.234 l. and the total expenditure from 1850 to 1876 was 3.680.850 l. st.

Information as to the nature of the roads constructed from 1850 down to 1876 is lacking. But if we base our figures on those which the period extending from 1841 to 1851 supply us with, we may assume that of the 3.680.850 l. laid out from 1850 to 1876 (inclusively) 2.452.000 l. were expended on broad roads and 1.228.000 l. on the narrow ones.

Admitting now thal the rates of construction have been subject to the same increase as for public high-roads, viz. 2 1/2 p. c. we will find that the mileage from 1850 to 1875 has been 304 l. 16 s. for broad roads and 189 l. for narrow ones. According to this, the extent of parochial roads in Belgium must be as follows:

Roads existing in 1850	5,853 miles
Roads constructed from 1850 to 1875.	10,515 miles
Altogether. . .	16,368 miles

of which 4092 miles are occupied by broad roads and 12,276 by narrow ones.

According to the foregoing figure, the value of the former must be 600 l. per mile, say together . . . . . 2.455 200 l.
and that of the latter, 371 l. 10 s. say together . . . . . 4.561.362 l.

Total. . . 7 016.562 l.

which represents the aggregate value of parochial roads in Belgium.

Canals. — In 1860, the length of canals in Belgium reached 550 miles.

The following is a correct account of their price:

The canal running from Liège to Maestricht and

which was dug from 1846 to 1850 cost 298,210 l. and ran over 12 miles, 4 furlongs, so that the price of a mile was 23,856 l. 16 s. per mile.

The *Canal de la Sambre*, a canalized river, was purchased in 1835 at a cost of 520,000 l. It is 58 miles, 4 furlongs in length, so that each mile must have cost 8,889 l.

The canal running from Mons to Condé was constructed in 1813. It cost 120,000 l. for an extent of 11 miles, which gives 10,909 l. per mile.

As the price of labor has risen since the period during which those three canals were built, we may take 12,800 l. as the present average price of a mile of canal work. So that the 550 miles existing represent an aggregate value of 7.040.000 l. — and we are not overrating them.

Now, if we totalise the various amounts under the head of " Railroads, highroads, parochial roads and canals " we find Belgium's wealth in property of the kind to be as follows :

Railroads	48.985.000 l.
High roads	11.145 173 l.
Parochial roads	7.016 562 l.
Canals	7.040.000 l.
Total. . .	74.187.735 l.

Belgium's property in foreign stock.

There are an immense number of capitalists and monied men in Belgium ; we must therefore add to the country's wealth the value of foreign securities held by Belgian subjects.

These, according to returns published in 1878 by the

Moniteur des Intérêts matériels, are as follow :

Foreign shares.	1.877.030 l.
Foreign State of City funds. . . .	25.889.695
Foreign bonds	13.284.526
Total . .	41.051.251 l.

Of course we are assuming that all Belgian securities are held by Belgians-which cannot be the case. But as the foregoing figures only represent by approximation the country's property in foreign stock, the excess certainly must balance the amount of Belgian stock held by foreigners.

Miscellaneous.

The property included under this head comprises so many articles (the war and merchant navy, the fortifications, the army's working stock, etc.) that it would be difficult to assign to it an exact value. Still, if we are to believe competent authorities, it may be taken for granted that such property at least represents 40.000.000 l.

If we now totalise the various amounts which appear in the foregoing paragraphs we will find the material property of Belgium to be :

	Pounds sterling
Landed estate	412.623.520
Vegetal produce.	37.742.496
Cattle	24.000.000
Real estate	140.000.000
Public buildings.	156.722.000
Furniture, pictures, etc.	162.688.000
Mines and quarries.	15.871.200
Stock in trade	12.000.000
Gold and silver	64.690.040
Railroads, highroads, etc.	74.187.735

Property in foreign stock.	41.051.251
Miscellaneous	40.000.000
Total . .	1.181.576.202

The above sum may be safely carried up to 1.200.000 000 l, which, if distributed over the 6.881 169 acres of Belgian land, give a value of 175 l. to each acre, while distributed among the population it shows the average property to represent 220 l. per individual.

Now that we have reviewed the several items of Belgium's material wealth, it becomes us to point out in what manner, by what means and with what materials public fortune has thus been built up.

Public instruction has long been acknowledged to be the real foundation of labor and the most fruitful source of wealth. Let us, then, begin by studying the organisation of Education in the country which is the subject of this work.

In 1875 the Belgian Public Instruction Vote reached 420,000 l. st. the ratio of uneducated youths from 18 to 20 was at that time about 22.92 per cent.

There were altogether 5587 elementary schools. In 1845, out of 426,385 pupils, 195,967 — about half — received gratuitous instruction. In 1875, the number of pupils had risen to 653,637 of whom 445,685 — about two thirds — were educated without charge.

Below elementary education, there exists in Belgium a set of schools destined to keep young children whose parents are out working all day, and meanwhile to train and prepare them for elementary schools.

These schools or " homes " known under the name of *écoles gardiennes* have rapidly extended of late : In 1845, they were attended by 18,754 children(boys and girls), while in 1875 the number of pupils was 97,382 or nearly five times as large as in 1845. Two thirds of these children pay no fee.

The Government have also tried all they could to better the position of teachers and the following figures will show what has been done in this direction.

In 1853, teachers salaries' were only, on an average, a little over 28 l. st. per annum; in 1863, the average was 32 pounds and a fraction; in 1869, 50 l. in 1872, 54 l. and in 1875, 58 l. st.

Assistant teachers' salaries have progressed at the same rate.

Higher education which is given at the Universities of Ghent and Liége has also made very satisfactory progress. In 1835, our Belgian Universities were only attended by 1173 young men, say 28 per one hundred thousand inhabitants, while in 1876 they were attended by 3282 students, say 61 per one hundred thousand inhabitants.

The following is a general statistical table of the number of pupils attending schools of every rank in 1875 :

	University colleges	2,386
	Intermediate schools.	36,316
Primary education	Properly-called elementary schools .	652,652
Primary education	*Ecoles gardiennes*.	97,382
Primary education	Adult schools	204,693
Primary education	Hospitals, prisons	7,144
	Boarding schools.	16,533
	Religious schools.	915
	Training "	8,460

Military Academies	1,314
Professional schools (Engineering, mining, etc.)	8,592
Commercial schools	207
Agricultural » (including 120 conference halls)	18,861
Art schools	18,985
Total number of pupils . .	1,072,440

To give our readers an idea of the rapid strides made by Belgium, in the province of education, we cannot do better than sketch the organisation of public schools in one of our chief towns.

The city of Liége which is inhabited by 115,000 persons, coutains 66 different schools that may be classified as follows :

13 Gardens where teaching is giving to very little children;

30 Elementary schools;

16 Evening schools for adults;

4 Sunday schools;

1 Intermediate school for boys;

1 Professional school for girls;

1 Professional school for male pupils.

During last year these different schools were attended by an aggregate number of 14,964 pupils.

The plan on which every one of these educational establishments is built and organised has been carefully studied and improved in every detail.

Here are a few figures that will enlighten our readers on the subject :

The size of each school rooms is calculated so as to give accomodation to one teacher and 40 pupils. The rooms are lit sideways, so as to spare the children's eyesight and protect them from excessive heat; the

windows are equal, in size, to the fifth part of the extent of the room and placed at one yard and 2 feet above the floor, and ventilation is secured in such a way that 57 cubic feet of fresh air enter the room every hour. The play grounds are laid ont at the rate of 1 1/4 square yards for each pupil.

There are also in each of these schools, gymnastic grounds, 13 yards long and 18 yards wide, which are organised so as to enable forty pupils to go through physical exercises at the same time.

The school room furniture has likewise been most carefully selected and gradually improved. Among the conveniences devised in this respect, are the black-boards on which figures are chalked. These are fixed one behind the other; when the foremost of them is done with, it is set aside by a spring which brings forward, in its stead, the next board required, and so forth. A mechanical contrivance also causes these boards to wheel round and bend to and fro at will, so that the figures, geometrical or geographical designs on it may be clearly seen in turn by each pupil.

The size and shape of the benches and desks has also been settled in such a manner as to promote the bodily development of pupils instead of checking it, as is too often the case in public school rooms. The distance between the benches and the desks is neither small enough to compell the children to stoop, nor great enough to put them to a strain and a self-moving part of the desk brings the book immediately beneath the pupils' eyes when the reading course begins.

The benches are also divided into seats which a spring causes to get out of the way of the childrens' legs, when they rise to answer questions, and every seat has a back to it.

The stoves employed for heating the rooms are also admirably combined. On the conical part of the pipe through which the smoke escapes stands a small water engine in cast iron which produces just enough steam to heat the air in a reasonable way, without making it sultry and unhealthy. In summer, such stoves become powerful ventilators.

But, to return to the pedagogie feature of our subject, we may state that nothing is more complete than the maps drawn up for Belgian schools. These maps not only show the geographical divisions of Belgium and other countries, they also point out the geological nature of each district, give a description of the seas and rivers, an account of the production of the soil, etc... with details about the administrative organisation of each place, and the principal historical events relating to the various parts mentioned. The mere study of a map thus gives the pupils as thorough a knowledge of towns or countries as though they had travelled and lived in each of them.

Every school is further provided with wooden, plaster or, tin figures for the graphic teaching of geometry Of late, such figures have even been made in wirework, so that, besides viewing the external shape, pupils may examine the auxiliary or the principal lines formed inside. To each educational establishment is attached a small, though complete museum containing samples of every kind of article in every day use. The pupils can touch and look at the various objects laid before them, while the teacher is impressing them with their nature, origin, formation, etc.

For the teaching of music, there are a set of boards on which the notes are written in chalk, while a re-

peater gives the sound of each note, or tune as the theoretical demonstration is going on.

The teaching of arithmetics is organised in a similar manner. Apparatuses devised for the purpose give the key to all elementary operations, the fractions, the formation of weights and measures and so forth.

In 1875, the number of teachers in Belgium (1) was as follows :

Public lay teachers	6,775
» religious teachers	462
Private lay leachers in schools subject to Government inspection	149
Private religious teachers of the same category	1,157
Private lay teachers in entively free schools	630
Private religious teachers in the same position	1,577
Total . . .	10,750

Of these, there were 5,319 lay and 426 religious male teachers and 2,235 lay and 2,770 religious female teachers.

Whether this fine and practical organisation of public education accounts for the progress and wealth of the country at large is a point we leave to our readers' judgment.

We will now proceed to describe the agricultural, industrial and commercial branches in Belgium.

During 1877, the Veterinary Surgeons' School at Brussels was attended by 96 pupils; the Agricultural

(1) The ensuing figures comprised male and female teachers and assistant-teachers, as will be found further on.

Institute of Gembloux by 61, the Horticultural school at Vilvorde by 23 and that of Ghent by 35 — which gives us an aggregate number of 215 pupils attending special schools.

36 of these obtained degrees, namely, 15 candidates for the surgical profession, 12 as veterinary surgeons, 9 as agricultural engineers; and obtained certificates of ability-namely, 10 as horticulturers 45 as gardeners and 117 as farriers.

In 1866, the agricultural province was composed in the following manner :

Cereal plants and mealy substances.	Wheat.	708,855 acres
	Spelt	160,855
	Meslin.	88,718
	Rye.	722,415
	Buck wheat	53,588
	Barley.	109,042
	Oats	574,358
Husky plants.	Beans and horse beans . .	60,658
	Peas, vetches and mixtures.	34,113
Industrial plants.	Colza	66,030
	Flax	142,612
	Sugar beetroot	45,185
	Hemps, hops, chicoree, tabacco, madder, thistle stalks.	34,438
Roots and forage.	Potatoes	428,492
	Turnips, carrots, parsnips, beetroots fit for fodder. .	72,015
	Trefoil, lucern, sainfoin, spergula	443,907
Permanent meadows.	Mown meadows, grazings and orchards	914,515

Fallow fields.	134,727
Vegetable gardens	93,318
Miscellaneous.	1,771,546
Total extend of the agricultural domain	6,659,383

Of the above, 3,349,487 acres are cultivated by land-owners and 3,309,896 acres by farmers who only hold the land on hire.

We now come to the industrial province. In 1875, the number of factories, etc., at work was as follows.

31 Blast furnaces (cast iron).
175 Founderies.
55 Iron mills.
56 Factories for manufacturing iron.
3 " " working steel.
5 " " " copper
6 " " " lead.
21 " " " zinc.
1 " " " nickel.
1 " " " alumen.
76 Glass works.

These establishments were maintained with the assistance of 278 coal mines extending over 356,648 acres of land, and employing 108,543 hands; iron, pyrite, calamine, blend, lead and manganese mines which gave employment to 4,248 workmen and 1719 quarries where 25,643 hands were engaged. At the same moment, there were in Belgium 12,638 steam engines with an average force of 539,846 horse-power, and 14,214 boilers and generators.

We will now state the passengers, goods and luggage trafic on the Government's railroads during 1877.

In that year, the State's railways conveyed :

36,919,707	passengers.	
18,614	ton	weight of luggage.
232,078	»	» of small goods.
14,340,878	»	» of heavy goods.
1,212,046		bags of money.
418		equipages.
45,558		horses and heads of cattle.

Out of the 37 million passengers conveyed, only 42 were wounded and 7 killed; while, during the same period, 160 of the railway agents were wounded and 50 killed.

The trafic on private railway Companies' lines was as follows :

Passengers conveyed	14,488,008
Tons of luggage	12,019
» of small goods	120,138
» of heavy »	12,083,800
Bags of money	567,007
Number of equipages	268
Horses and heads of cattle	542,078

In the same year, the Post office department's traffic was as follows :

Letters conveyed	61,846,576
Newspapers	68,969,000
Prints	31,753,000
Money articles	1,004,618
Samples	1,636,000
Commercial circulars	181.000
Total	165,390,194

The Telegraph offices, on the other hand transmitted 2.910.687 despatches, distributed in the following manner :

Inland distribution	1,952,686

Distribution abroad.	723,298
Transit despatches	234,703
Total. . . .	2,910,687

In the same year, the country's commercial transactions reached the figure of 273,400,000 l. st., of which 177,000,000 l., may figure under the head of general trade, and 96,400,000 under the head of special trade.

The imports amounted to 52,300,000 l. st., which, when distributed equally among the whole population, gives a ratio of 10 l., per individual; and the exports amounted to 44,100,000, giving a ratio of 8 l., per individual; the goods in transit represented a sum of 40,200,000 l.. — say about 3 l. 10 s. per inhabitant.

Among the in-coming goods, were 1,833,000 pounds sterling worth of wool imported into Antwerp and 1,424,320 pounds' worth of skins.

Among the Belgian exports, in the same year, we may mention :

	Pounds sterling
Weapons, to the amount of	702,920
Candles	473,360
Wrought and figured iron	2,640,400
Cotton, woollen and hemp yarn . . .	4,441,400
Clothing	170,000
Machinery	1,900,000
Paper	716,000
Raw stones	1,609,000
Chemical produce.	296,000
Rosin and bitumen.	908,000
Sugar.	1,490,000
Woollen, cotton and linen fabrics. . .	3,248,280
Glass.	2,001,000
Non-manufactured zinc	934,280

It is highly important that we should now give our

readers some information concerning Belgian maritime traffic. Belgium contains the following seven ports : Antwerp, Ostend, Ghent, Louvain, Brussels, Bruges and Nieuport,

Of these, Ostend and Nieuport alone have a direct outlet into the sea. Antwerp is connected with the sea through the river "Escaut"; Ghent, through the Canal of Terneuzen; Bruges through the Canal of Ostend; Brussels and Louvain, through canals tributary to the Ruppel which runs into the "Escaut" at a small distance from Antwerp.

The Belgian maritime traffic is enormous and only yields to the traffic going on in Great Britain, France and Germany, as a few figures will show.

In 1876, the 124 ports in Great Britain received 66,898 ships of an average tonnage of 374 ton a piece and which therefore imported altogether 25,067,264 ton.

In the same year, 35,175 ships of 264 ton a piece, on an average, entered French ports, with a cargo of 8,946,669 ton.

Returns for the traffic in German ports during 1876 are not yet published; but in 1875, these ports were entered by 45,750 ships of 142 ton which brought in with them 6,505,215 ton of goods.

Next in importance, came Belgium whose seven ports were entered in 1876 by 6,320 ships of 453 ton a piece-viz, with a cargo of 2,864,720 ton. After Belgium, came the Netherlands whose 35 ports were visited by 8,592 ships of 321 ton, laden with 2,689,614 ton of goods.

The following table will show how and in what proportion the traffic was distributed in 1876 among the Belgian ports.

SEAPORTS	AVERAGE tonnage OF EACH SHIP	NUMBER of inward bound ships.	AGGREGATE TONNAGE
Nieuport. . .	117	21	2.468
Bruges . . .	160	78	12.438
Brussels . . .	95	151	14.319
Louvain . . .	187	176	33.038
Ghent. . . .	296	477	141.047
Ostend . . .	171	1331	227.996
Antwerp. . .	595	4086	2.433.414
TOTAL FOR THE SEVEN PORTS	453	6320	2.864.720

Of all Belgian ports, the only one that has shown a tendency to recede in importance, from its former position, is the port of Bruges. In the middle ages, Bruges was in direct communication with the sea and was at that time acknowledged to be the greatest maritime centre in the world. It owed its prodigious prosperity to its situation, seated as it was, near the sea, on an extensive and deep-bottomed gulf.

As long as it remained undisturbed, Bruges preserved its great commercial power, but when the channels which connected it with the sea came to be obstructed, it naturally fell rapidly and saw its future prospects irreparably damaged.

Some writers hare ascribed its decline, to the effects of the invention of the sea-compass, or to the discovery of America, by Christophus Columbus, or again to the internal troubles which at one time upset the Flemish population of the port. But none of these assertions is

founded on facts. The only causes to which the fall of Bruges, as a first class sea port, can be traced, are the accumulations of clay wich gradually filled the Zwyn and, the the gradual invasion of the seaports' maritime outposts — the harbours of Damme and of l'Ecluse — by great heaps of sand.

In 1213, the harbour of Damme was still one of the largest in Europe. As an instance of this, we may recall the fact that Philippus-Augustus entered the harbour, with a fleet consisting of 1700 sailing ships, to fight the combined naval forces of the English and Flemish.

A century later, the traffic had increased in such a measure as to impell the Bruges authorities to extend their maritime channel as far as l'Ecluse, a town situated on the Zwyn, about five miles downwards from the harbour of Damme.

The new canal, which had been constructed on a large scale, passed through Dudzeele and Westcapelle, and extended over 13 miles, 5 furlongs. It gave a fresh impulse to Bruges' commercial trafic; from 1420 to 1470, the traffic that went on in that port knew no limits, and the city's fortune had reached its climax.

But from 1470-twenty-two years before the discovery of America — sand began to heap up in the Zwyn, and from that time onwards, the disastrous effects of such an accident began to be felt more acutely every day. It was only with the utmost difficulty that Portuguese West-Indiamen, galleys and other large vessels managed to squeeze through the channel and in 1482 they even gave up trying it.

Bruges was doomed and its decay had begun. Under Albert's and Isabelle's reign, in 1622, a canal was or-

dered to be constructed between Bruges and Ostend; twenty years later, a new channel was dug between Bruges and Nieuport and between Nieuport and Dunkerque; in 1717, the powerful East-India Company was founded at Ostend. In 1783, King Joseph the second attempted to begin works intended to cause the Flemish waters to flow into the sea; in 1810, again, Napoleon sought to dig a canal between Bruges and Reskens, which was to pass through the harbours of Damme and l'Ecluse; and the Dutch Government took Napoleon's scheme in hand, in 1829. But these and all the other attempts made to rescue and restore Bruges' greatness utterly failed and were bound to fail, either because of political disturbances, or on account of the technical difficulties attending the realisation of such dreams.

At the present day, M. De Maere, a Belgian engineer, has set forth a plan for the revival of Bruges, by means of a new port which he proposes to build on the northern sea, at Heyst, and which might be put into direct communication with Bruges, through the medium of an unusually wide canal.

According to the author of this plan, the port of Heyst should be provided with piers 880 to 1210 yards in length, and whose foundations should stretch over 1100 yards, with wingwalls of 330 yards respectively.

The canal should be 7 miles and 4 furlongs in length and its width, as reckoned from the roof, 22 yards, while its water line should measure 68 yards.

This ingenious scheme is about to be carried out and it may possibly be the means of the port of Bruges retrieving some day its shattered situation.

The port of Ghent which at one time also appeared to be on the decline is fast recovering and will probably

soon occupy a finer position than ever, after the Dutch part of the canal of Terneuzen has been widened. The widening of this canal is at present the subject of negociations between the Belgian and Dutch Government and no one doubts but that it will soon be carried into effect. The large Transatlantic ships will then be able to run, without the sligthest difficulty, from the mouth of the " Escaut " to the Ghent Docks.

The ports of Brussels and Louvain whose traffic is every day increasing, are also claiming more direct communication with the sea and a plan intended to give them satisfaction in this respect, is being contemplated. The draught of the Brussels and Louvain waters only attains 3 yards and a half and this is justly considered insufficient. Both of them run into the Ruppel-a river which can only let through ships draughting from 3 3/4 to 4 yards water. The Ruppel cannot, therefore, be selected as the river into which the new canals should be conducted; the Escaut would be the proper river, its depth being quite sufficient even at low tide, and especially on the left handside of the mouth of the Ruppel opposite Ruremonde.

Indeed, the Escaut is the river which the government seem bent upon selecting as the outlet for new canals connecting Brussels and Louvain with the sea Each of these canals will be made 7 yards, 14 miles deep, so as to give access to sailing ships or steamers of at least 2 or 3000 ton. The width of these canals, reckoned from the roof, will attain 22 yards, and slopes being cut inside, the water line would measure 64 yards in breadth. The two canals will be lined on each side with a towing path,one yard above the water line. The sluices will be 15 1/2 yards in width and 132 yards in length. Both Brussels and Louvain will be

provided with docks covering 28 acres of ground, with 2800 yards of embankment. Such changes will place Brussels and Louvain almost on a level with Antwerp, the largest and finest of Belgian ports and one of the most busy in the world.

London and Liverpool are indeed, the only maritime places that can compete with Antwerp. The following statistical bable (1) will show, by comparison, the importance of the latter and the amount of traffic which it gives rise to:

SEAPORTS	AVERAGE tonnage OF EACH SHIP	NUMBER of in coming ships	AGGREGATE TONNAGE
London . . .	455	11601	5.288.700
Liverpool . .	835	5381	4.494.356
Antwerp. . .	595	4086	2.433.414
Newcastle and Shields	338	6537	2.212.670
Hamburg . .	406	5260	2.117.822
Marseilles . .	388	5345	2.077.820
Le Hâvre . .	541	2922	1.580.669
Hull	443	3469	1 538.722
Rotterdam . .	408	3445	1.406.934

The foregoing figures also show that of all European sea ports Liverpool and Antwerp are visited by the heaviest ships. From this it is easy to infer that they are the largest-sized ports in Europe.

The Escaut which connects Antwerp with the sea is

(1) The figures that follow are for 1875.

a magnificient river. To describe its peculiarities, we must enter into a few geographical details not devoid of interest.

The two principal features of the Escaut are the nature of the tide and the topographic constitution of the vast plain which extends over the north of Belgium.

The great astronomer Laplace has shown that the moon alters the shape of the surface of the sea-causing it to swell in, when passing through the meridian of such or such a place.

The sun exercices a similar influence. Laplace also found that the effects of the moon and of the sun on water either concur with each other or destroy each other, according to the respective position of those planets with regard to the earth.

The tide is an immense undulating billow which keeps pace with the moon, in running from meridian to meridian; it cannot be considered as a maritime current but merely as a kind of expanding of the liquid mass which shifts with sufficient speed to run round the globe in the course of one day.

Of course, this description only applies to the tide affecting deep-bottomed seas, for the movements of the tide undergo great alterations in shallow places or in waters where it meets with obstacles of any kind, such as islands or continents.

The undulations of the tide are felt, in rivers, through the medium of currents whose speed is dependent upon the height of the tide itself and the power of the river, as compared with the extent of its surface.

We have stated that the tide could not be considered as a current; it nevertheless assumes such a character in certain parts of the sea and alongside of rivers' banks, with the assistance of currents commonly

known as " tidal currents. " These occur on Belgian costs and they greatly affect the movements of the Escaut which runs ont directly into the sea.

The Escaut therefore shares in all the variations which the tidal waves and the tidal currents subject the height of the waters. Such are the influences that affect our beautiful river.

The tidal flow occurring on Belgian coasts is a branch of the large outflow that runs from the Cape of Good Hope, brushing bye South America and re-ascending northwards. It is cut off, further, on by the British Isles.

The western branch of the tidal flow which expands on the Ocean, runs by Scotland, and recedes southwards into the Northern Sea; it then joins the branch of the current which has previously crossed the Calais Straits and invaded Belgian coasts, without approaching the English coasts-these being exclusively affected by the northern current. The pressure produced by the latter thrusts the current passing through the Calais Straits back into the banks of the Netherlands and Belgium.

The superiority of the Escaut tides over those that affect the mouths of the Delta, the Rhine and the Meuse is increased by the presence of the island of Walcheren in front of our river.

This island projects over 3 miles from the Belgian borders. The tidal current that runs by our coasts is abruply arrested by the Island of Walcheren. It is to this natural accident that are due the remarkable depth of the mouth of the Escaut and the power of the tidal flow which proceeds up the river. The tide thus brings periodically into the Escaut uniform water-levels.

At high tide, the mouth of the Escaut between the fortress of Breskens, south, and Flessingue, north, measures 5,500 yards in breadth.

In front of Flessingue, and over an extent of about 3,590 yards, the water currents and ebb tides maintain the depth between 21 and 30 yards. At Terneuze, the depth of the river's bed is 35 yards.

In the vicinity of Bath, the bottom of the river, at low tide, measures 2,650 yards, whereas, at a high tide, the surface covered by water attains an extent of 6,325 and sometimes as much as 10,400 yards between the dikes.

From Flessingue to Lillo the river covers, at low sea a surface of over 50,000 acres and, at high sea, a surface of over 80,000.

Between tidal hours 1,200,000,000 cubic feet of water run through Flessingue.

Let us now glance at the road which lay for ships in front of Antwerp. This road is over three miles in length. The width of the Escaut varies considerably within this small expanse of water. At Burght during low tide, the river measures 440 yards; a little further down, it increases to 650 yards, and then falls again to 350 and 320 yards, in front of the Werf. From the latter point, the river widens up to 450 yards, below the Kattendyk sluice.

The only fault that can be found with the Escaut is that its delineation is defective. But a Royal committee instituted in 1870 has devised a plan for correcting it and changes will soon be brought about which will make it perfect.

According to this plan, the right bank of the river will represent a curve consisting of three segments of a circle connected together by their touching lines.

The radius of the middle segment will be 25,000 yards and its length 1,080 yards; while the radius of the two other segments will not exceed 1,100 yards. The road for ships will then offer a uniform width of 385 yards.

The commercial importance of Antwerp can be traced to the fall of Bruges. At the time Bruges declined, Antwerp was a manufacturing rather than a shipping place, and contained many more bankers and merchants than ship-owners.

The Italian Republics that traded with India through Egypt and the Red Sea, before Vasco de Gama had sailed round the Cape of Good Hope, conveyed Asiatic produce to Antwerp, and the traders in the Hanseatic towns exchanged for these the produce of the North. The Flemish produced linen fabrics, tapestry, cloths, leathers and other ware and so Antwerp was looked upon as the general warehouse of North and South, the very counting house of neighboring States.

After the discovery of the Cape of Good Hope, the Portuguese who had attracted to themselves the whole of the trade between Europe and the Indies, also brought Asiatic produce into Antwerp where they owned bazaars which are still remembered in the town under the name of *Maison de Portugal.*

The fairs that were held at Antwerp attracted thither merchants and traders from every parts. Guichardin, the Florentine Minister whose assertions deserve entire credit, states that in 1566, the spices and sugar imported into Antwerp from Portugal were worth a million and a half of *ducats*; Italian silks and brocades, 3 million; cereal plants from the Baltic Sea, over one million; French and German wines 2 million and a half; and English goods 12 million. Over 12,000 foreign busi-

ness houses were settled at the time at Antwerp; a trader of the name of Fugger, a native of Augsbourg, bequeathed, when he died, a fortune amounting to a million and a half sterling.

Towards the middle of the 16th century, at least 2,500 ships were constantly assembled in the Escaut, plying principally between Antwerp, England, Spain and Portugal. The two last-named countries, which were wonderfully behind hand as regards manufacturing processes, applied to the Flanders even for their furniture and kitchen utensiles.

The city of Antwerp received every week from the wallonic provinces and from the North of France 2000 waggons of goods heavily laden; and there was hardly a district in Belgium that did not feel the beneficial effects of such extraordinary activity.

A census taken in 1568 showed the population of Antwerp to consist of 105,000 inhabitants. But religious feuds soon came to put an end to the wealth and prosperity of that celebrated city.

Antwerp had, indeed, become a meeting place for the Lutherans, the Calvinists and the Anabaptists. The great Spanish King, Charles the Fifth, determined to make an onslaught upon the reformers.

In 1550, the practises of the Inquisition were introduced in Antwerp and torture applied to Protestants. In 1576, the town was fearfully sacked by the Spanish soldiery who put to death no fewer than 7000 of the inhabitants.

In 1584, again, Antwerp had to sustain a fourteen months' siege against the forces of Duke Alexander of Parma and the surrender of the besieged completed the ruin and downfall of the city's trade. In that year, the population had dwindled down to the figure of 50,000.

All these calamities were crowned by the loss of the navigation of the Escaut which was given over to the northern States, in 1609, at the time of the formation of the United Provinces, while one of the principal clauses of the Treaty of Westphalia (1648) provided for the closing of the river. In 1790, the population no longer consisted of more than 40,000 souls.

In 1804, Bonaparte visited Antwerp and resolved to turn it into a great maritime arsenal. He ordered docks large enough for a whole fleet to be constructed, and when Belgium fell under the rule of the Dutch, the latter's connection with India was the making of Antwerp as a sea-port.

Now, that the Belgians have recovered their independance, the Dutch trade with India through their owns ports. Yet the extension which Napoleon had given to Antwerp was such that no blow could any longer affect its prosperity, and the port, since the beginning of the present century, has been growing and growing in magnitude, wealth and business, as time has worn on. The population in 1876 was thicker than it had ever been in its earlier and most flourishing days. It comprised 186,247 souls.

The two docks which Napoleon caused to be built in 1804 and 1813 cost over 500,000 l. st. The smaller of the two is 197 yards long and 167 yards wide and is capable of containing 100 ships; the larger one is 457 yards long and 197 yards wide and can contain 250 ships. But these two docks have in time become quite insufficient. Four new ones, (1) measuring about 770 yards in length and 110 yards in width have

(1) The *bassins du Kattendyk; bassin au bois; bassin de la Campine* and *bassin du Canal.*

since been constructed, and a new and still larger one, for which the Belgian Chambers have granted a vote of 2,120,000 l. st., is being built at the present time.

In 1875, 6066 ships entenred Antwerp- of which 3664 were steamers with an aggregate tonnage of 2,440,681 ton and with a crew of 93,592 men, besides a cargo of 2,338,637 tonweight.

During the same lapse of time, the ships that left Antwerp numbered 6052, of which 3650 were steamers having on board a crew of 93,732 men and a cargo of 1,723,818 ton.

The in- coming and out- going traffic in goods therefore amounted altogether to 4,062,455 ton, and this has been so far increasing that in 1875 it exceeded 5 million ton.

Antwerp is surrounded by an enclosure wall of 5 miles circuit constructed a mile and a half in front of the old city walls. At about 3 miles away from this great stone belt, Antwerp is protected by 10 fortresses armed with heavy guns. The military works, although not yet complete, have already cost over 2.000.000 l. st.

Volumes could be written about this gigantic seaport, but our space is unfortunately limited and we must now proceed to say a few words concerning the position of the Belgian Government's Finances.

In 1876, the accounts of the National Bank showed the amount of cash to be 4.667.026 l. st., notes in circulation amounted to 14.582.370 l. st.; securities, to 12.272.890 l.; deposits, 3.051.072 l.; public funds, 1.340.561 l.; the reserve fund, to 501.775 l. st. and instalments on public funds to 205.864 l.

The average rate of discount during that year was 2.75 p. c. for acceptances and 3.25 p. c. for non-acceptances.

We have stated that the notes in circulation amounted to 14.582.370 l. st. This sum was distributed as follows :

In notes of 1000 francs	. . . .	6.077.680 l. st.
Notes of 500 francs	. . . . .	1.137.480
» 100 »	. . . . .	5.453.384
» 50 »	. . . . .	971.296
» 20 »	. . . . .	942.530
		14.582.370 »

The *Caisse générale d'épargne et de retraite* (General savings' and annuities' Bank) under the State's supervision, commanded in 1876 as many as as 547 agensies which had performed the following transactions :

During the year, 34,470 new Bank books had been delivered, to which must be added 106,312 already existing, so that in December 1876, the number of depositors in the Savings' Bank reached 140.782 from which number, we must, however, deduct 18,009 who had taken re-possession of their savings and whose bank books had therefore become extinct. The net number of bank books in 1876 was accordingly 122,773. The deposits received during the year amounted to 283,355 representing an aggregate sum of 2.037.276 l. st. The balance, on the 31st of December 1876, amounted to 1.794.284; interest grown out of principal, 64.129 l., and interest on five years' deposits 45,585 l., giving a total figure of 3.991.274 l. st. If we deduct from this 1.311.760 l. re-imbursed, we will find that in 1816 the balance in favor of the Bank was 2.629.514 l. st.

The average amount of each deposit, as reckoned according to the number of deposits, was 7 l. 7 sh.

We will conclude this practical demonstration of the Belgiam people's saving propensities by giving a sta-

tistical table of the situation of a few of our private savings banks in 1876.

NAMES OF BANKS	DEPOSITS		Re-imbursements		Balance on 31st Decemb		Rates of interest
	Number of bankbooks	Amounts (1) deposited	Closed bank books	Amounts re imbursed	Bankbooks remaining open	Remaining deposits	
Société générale pour favoriser l'industrie nationale . . .	3261	205.105	3485	196.249	19.318	561.948	3%
Banque Liégeoise . . .	9985	88.995	1360	83 704	8.625	150 318	3%
Société anonyme de la Vieille Montagne . .	»	9.888	»	8.035	651	24.344	5%
Banque de Huy.	98	2.862	308	4.841	626	6.148	3 1/2%
Ville de Malines.	749	21.585	299	9.155	2.543	58.902	4%
Ville de Nivelles.	365	59.042	475	58.226	3.111	178.100	3 1/2%
Ville d'Alost. .	245	8.611	186	6.951	59	5.656	3.60%
Ville de Tournay	766	22.476	294	23.015	7.222	135.378	4%

We regret being unable to enter into further details concerning Belgium. Still the rough outlines which we have sketched will, no doubt, give our readers a pretty fair idea of the organisation of Belgium.

They will have gathered from these pages the fact that, although geogeaphically and politically a small State, Belgium is one of the most remarkable and most advancedin cultivation and taste. Indeed, let anybody look at the amunt of trade it transacts and think how narrow the extent of land it covers and how small the population it owns, and it will be found that no nation ou the Continent — however graet — is comparatively as great as Belgium.

Nor is it to be apprehended that the country will ever recede from its position and wine away as many

(1) In pounds sterling.

Eastern countries have in the course of the world's history. Belgium is naturally a peaceful land; thoroughly free from any of those political anxieties which periodically threaten the future of greater nations and sometimes bring them to the very verge of ruin. The Belgian people enjoy a most liberal Constitution. They are loyal to their king and are no more exposed to internal troubles than to troubles from without. They are industrious and saving, educated and active. A spirit of love and peace unites every class and nowhere are associations more mumerous- we speak not only of commercial associations, but also of such private associations as are intended to promote kindly feelings of frendship between the citizens of a same district, a same town, or a same village. Everything, in short, tends to warrant for them an uninterrupted era of growth and prosperity and we therefore confidently believe that the Australian people who have had to fight so hard against the difficulties attending colonisation will easily tender their sympathy and support to a people who have also had to go through very rough times and to battle strenuously against immense obstacles before attaining the position which they now occupy.

CHAPTER THE FIRST

Non-Manufactured and Manufactured Metal

Our readers will not expect from us even an epitomised account of the history of metal in Belgium. The subject would require volumes and we can only dispose of a few lines.

We shall therefore only record a few of the general circumstances to which Belgium owes its exceptional position as an essentially metallurgical country.

After the downfall of Rome, the metallurgical industry shared the fate of art in Cœsar's Empire, and Germany and Belgium were the only two countries that continued working iron and copper ores. Alchymy was the means of leading to the discovery of the real composition of ores and metals and its was in Belgium the first and most remarkable experiments in that direction were made. It was in Belgium that the *flussofen* or ovens employed to melt iron, originated, afterwards being adopted in Sweden, Saxony, Silesia and at the end of the 17 th. centuny, our countrymen completed this boon by inventing the process for manufacturing steel of cementation which has since rendered such extraordinary services.

It may, therefore, be said that Belgium was, in earlier days, the very foremost nation in the world, as regards manufacturing metal, and the wonderful amount of raw metal it produces or employs for manu-

facturing machinery shows that it is far from having relinquished its position.

The chief metals extracted from Belgian mines or simply dressed, are iron, pyrite, calamin, blende, lead, manganese, steel, copper, zinc, nickel and alumen.

The following figures show the amount and value of the production of Belgian mines during 1876 :

		Ponds sterling
Iron *(washed ore)*. .	296,206 ton. . .	98,316
Pyrite	23,588 » . . .	22,623
Calamine	15,974 » . . .	37,751
Blende	21,739 » . . .	64,450
Lead *(galena)*. . .	12,422 » . . .	68,083

Our mineralogical factories produced during the same period :

		Pounds sterling
Steel.	75,258 ton. . .	625,652
Copper	2,592 » . . .	246,900
Lead	7,375 » . . .	155,550
Zinc	70,369 » . . .	1,605,567
Nickel	2 1/2 » . . .	1,300
Alumen.	2,640 » . . .	14,978

Although the iron trade is the subject of almost universal competition no one of the competing countries can be said to dress metals more perfectly than Belgium, and none can boast of a more splendid staff of workmen and engineers than we can. In iron-manufacturing alone, the country employs over 40,000 hands and the production amounts to 11.000.000 l. st. Our iron ores are inexhaustible as can be inferred from the fact that whereas they yielded 296,206 ton in 1876 they now yield 360,000 ton.

Fuel is plentiful and this is perhaps one of the principal secrets of the vast proportions which the iron trade has acquired in our country. The means of communication in Belgium being very much more complete than inmany other producing countries, including France, our manufacturers have not to contend against the difficulty arising in other places from the distance

that lies between the metal mining and the coal mining districts.

The ores employed in Belgium are hœmatite and oligiste ores lying in the province of Namur and minettes from the Belgian part of Luxembourg. The malleable iron which they yield is pretty much the same as the Staffordshire iron. The ores drawn from native mines are, in a slight degree, steely.

With their cast iron, our manufacturers turn out puddled steel, machine plates, tyres, etc.

Since a period of about fifteen years *i. e* since the introduction of the Bessemer process, they manufacture beautiful steel, by the working of manganesiferous cast-iron. Our production in steel, chiefly Bessemer, exceeds 50,000 ton worth over, 600,000 l. st.

Iron ores are worked in 41 of the Belgian boroughs, with 18 drawing-up engines of 211 horse-power each and 27 water engines of 539 horse-power a piece, besides 1454 workmen.

The provinces of Liége and Namur furnish us with lead. In 1876 the former yielded 6902 ton and the latter 5520 ton.

It is also from the province of Liége thal our zinc supply is drawn. Our production in this line is very large. Two of our facturies alone, employing 3,000 hands, produce over 75,000 ton worth nearly 2 million sterling. Our engineers employ great quantities of zinc to preserve the iron bottoms of ship from the corroding effects of water.

The advantage our Belgian manufacturers reap from such abundance of metal cannot be too highly valued.

To it is due our countrymen's *penchant* in favor of engineering and ship and railway building. Technical education in Belgium is finer and more complete than anywhere, so that, provided as we are with plenty of good raw material and hundreds of experienced engineers, the machinery we turn out is at the same time lower in price and more perfect in make than any other country's produce. The fact is so well established that Belgian machinery is employed all over the

world and thal in spite of the quantities of iron yielded by native mines, over 700,000 tons have to be imported (free of duty) into Belgium for manufacturing purposes. The amount of Belgian machinery exported exceeds 3 million sterling and is every day increasing. Liége, Brussels and Couillet are the headquarters of our large producers of metal and manufacturers of whom we will now give a short and reliable list.

The produce of the Société John Cockerill, of Seraing (near Liège) will be the first to attract the notice of engineers and men of technical knowledge at Sidney.

The following is a list of what the firm have contributed to the Exhibition :

A steel rail, 200 feet long, enrolled; Several sets of figured iron, double T and [_____] iron, round, flat and zores-shaped iron, etc... ;

A crank-axle in steel for locomotive engines and steel connecting-rods, wheels in wrought iron with fat spokes and end-planes;

Steel axe trees, tyres, springs, chains, etc. embossed plates, weapon plates;

Several sets of boilers' bottoms (chased). Foundry stock, such as conical or perpendicular wheels, cylinders for steam-engines, etc.

Any remarks we might make about these or any other of the Société Cockerill's manufactures must necessarily assume the shape and tone of an eulogium, for they are as perfect as any and far superior to most of similar produce manufactured in any part of the world. This being an undisputed fact, we will not lay much stress, upon it, leaving our Australian friends to study with their own eyes what few samples lay before them of the work performed by the eminent firm we allude to.

Nor shall we enter into an elaborate narrative of the

circumstances which led to the foundation of the Société Cockerill and have made it what it is. Suffice it to say that in an industrial country like Belgium, the Société Cockerill is considered as one of the institutions that contribute to the greatness and glory of the nation, while Englishmen are certainly entitled to a share of the credit such an institution reflects on Belgium, since as the mere sound of its name shows, the Company owes its existence and standing to a great engineer of Anglo-Saxon blood : John Cockerill.

It was John Cockerill who, at the requested of the king of the Netherlands, William the Second, started the factory in 1817. John Cockerill was, as Shakespeare styles it " a man of many parts " It was he who constructed the first rail and locomotive that appeared on the Continent and it was also he who was the first to turn out blast and puddling furnaces. At the time of his death (1840) his Seraing works could already be considered as among the most extensive in existence, employing as they did more workmen than there were inhabitants in the wole district when John Cockerill settled down in Belgium.

The Société Cockerill has since been steadily growing and extending the sphere of its action and in spite of the enormous figure of business it transacts and the number of wants it supplies (1), its present manager, Mr Sadoine, a gentleman of much experience and ability, seems to act on the principle that nothing is done as long as there is anything left to do, and that no establishment is prosperous until it has reached the very pinnacle of prosperity. It is this reason which induced Mr Sadoine to secure for the Company's manu-

(1) The Société Cockerill's establishment comprises blast furnaces, iron and steel foundries, immense workshops for constructing general machinery plates, steel guns, bridges, etc... a yard for building breast-plated and other ships, vast collieries, etc. It covers an area of over 220 acres and is divided into twelve different departments. In salaries alone, the firm annually expend nearly half a million sterling.

factures a fresh outlet in Australia by placing some of these before the competent men who visit the Sidney Exhibition for practical purposes.

The Société Anonyme de Marcinelle et Couillet, managed by Mr A. Maroquin, is another of those powerful companies that prosper in Belgium, thanks to the metallurgical and mineral wealth of the country.

When started in 1835, the Company to which we allude only worked with a few puddling furnaces and a small forge. It is now, with the Seraing and the Creusot works, one of the most formidable institutions in the world, as a summary statement of its functions will show.

At Couillet (the Company's head-quarters) the Société Anonyme de Marcinelle et Couillet's estates comprise blast and coke furnaces, rolling mills (for manufacturing rails, bar and section iron, metallic sleepers, etc...) iron and brass foundries; boiler shops, heavy forges and locomotive shops;

At Chatelineau, it works blast and coke furnaces; plate and sheet mills, rolling mills (for producing small iron and bar iron sections, etc...) boiler and bridge shops, stationary and locomobile engines.

At Marcinelle and Chatelineau, they own two collieries comprising ten pits;

In the Province of Namur and the Grand Duché de Luxembourg several iron ore minings that yield enormous quantities of metal. A private railroad connects these various departments together.

The Company's working stock consists of 12 blast, 250 coke and 58 puddling furnaces, 38 welding and re-heating furnaces, 12 sets of rolling mills, 12 cupolas, 3 foundries, 3 boiler shops, 100 forge fires, 14 winding engines working at the collieries and ore mines, 8 pumping engines, 12 blast furnace blowing machines, 28 steam engines for the rolling mills and engineering departments; 77 miscellaneous apparatuses, 191 fitting

shop machines, 7 locomotives and 184 boilers aggregating 6841 horse-power.

With such extraordinary means of production, there is hardly any limit to the company's manufacturiug field. The Société de Marcinelle et Couillet's blast furnaces produce foundry pig, puddling pig and railway chairs. Their rolling mills turn out iron sheets from n° 15 W. G. upwards, chequered plates up to 40 " breadth, boiler plates, ship plates, locomotives, frames, flitch plates up to 23 1/2 breadth, rails from 8 to 74 lbs, fish plates and rail fittings, ⌊ ⊥ ⌈ ⌉ iron, sash iron, grate iron, tyres, metallic sleepers and bar iron of all sizes and qualities up to 8, " tram rails and fittings; rolled joists from 3 1/4 to 12. The Company's engineering department build locomotives from 2 1/2 to 50 ton, tenders, locomobile engines, winding engines, blast engines, water-lifting engines for water works, pumping engines for mining purposes, machinery for rolling mills and for ventilating mines, boilers, water-wheels, bridges and iron buildings, cast iron tubbings (T'Kint and Chaudron process), wrought iron trepans, heavy iron tables for plate glass casting, iron boats and barges, air-compressing machinery for mining purposes; an exceptionally large number of locomotives for agricultural, mining and other purposes running on roads of 16 1/2 to 39 1/2 gauge. The collieries of Marcinelle and Châtelineau, on the other hand, yield washed or raw coal, steam coal for manufacturing and household purposes and washed or raw coke.

The Company's total production amounts to a million tons *per annum,* representing an income of over a million and a half sterling, all of which is absorbed by France, Germany, the Netherlands, Russia, Austria. Turkey, Hungaria, Wallachia, Sweden, Norwegia, the United States, the Antilles, the Brazils and other distant countries, the firm having a wide connection throughout the globe.

They give employment to over 6,500 hands- and have made themselves very popular by erecting free schools for their workmen's children; building cheap and

healthy lodgings for the wole of the working community and making provision for their sick workmen or workmen's widows. In this respect, the company's organisation is a pattern on which all humanitarian institutions should be shaped.

To describe the intrinsic merits of the firm's produce would require more space than we can dispose of. We can say no more than that everything the Company turn out bears the stamp of careful workmanship and mechanical perfection; the raw materials they employ are the best that can be procured and the condition of their machinery (many parts of which are of their own invention) betrays a degree of experience, laboring skill and engineering ability it would be impossible to carry to a higher pitch. In support of this, we may state that the firm were awarded the 1st class prize medal at the London Exhibitions in 1852 and 1863, two gold medals at the Paris Exhibition in 1867 and the highest award at the Vienna Exhibition in 1873. The Company were prevented from competing for prizes at last year's Paris Exhibition, owing to the President of their Board being selected as a member of the jury.

The following classification of the firm's rolled iron and plates and sheets will no doubt promote large transactions between Australian manufacturers and the SOCIÉTÉ DE MARCINELLE ET COUILLET.

Classification of the Couillet Co's rolled iron.

BRANDS	DESCRIPTION	Corresponding ENGLISH QUALITY	Pulling Strain per square inch		Elongation.	
			With the rolling	Across the rolling	With the rolling	Across the rolling
No 1	Low quality for purposes where the metal undergoes no forge work . .	Ordinary				
Couillet No 2	Ordinary quality for forge purposes only	Good	20 tons	12 tons	5p 0/0	0p 0/0
Couillet No 3	Superior quality for forge and cold purposes	Best	22 "	15 "	10 "	2 "
Couillet No 4	Superior quality for difficult forge work.	Best-Best	24 "	17 "	13 "	3 "
Couillet F. G.	Extra quality for difficult forge work.	Fine grained	28 "	20 "	15 "	4 "

Classification of the Couillet Co's plates hand Sheets.

BRANDS	DESCRIPTION	Corresponding ENGLISH QUALITY	Pulling Strain per square inch		Elongation.	
			With the rolling	Across the rolling	With the rolling	Across the rolling
Chatelineau No 2	For bridges tanks and ships plates .	Good	20 tons	15 tons	6p 0/0	2p 0/0
Chatelineau No 3	For boilers	Best	22 "	17 "	7 "	3 "
Chatelineau No 4	For purposes where the edges have to be turned up . .	Best-Best	24 "	19 "	10 "	5 "
Chatelineau extra	For purposes where the edges have to be turned up . .	Extra	25 "	20 "	12 "	7 "
Chatelineau F, G.	For purposes where the edges have to be turned up . .	Low moor	28 "	23 "	14 "	9 "

Another most important iron establishment is that of Messrs PIERARD FRÈRES, established at Montigny-sur-Sambre, near Charleroi, and known as the *Forges Fonderies et Laminoirs du Marais* (The Marais Forges, Foundries and Rolling Mills).

Messrs Pierard frères and Co's chief manufacture is good quality iron.

Their merchant and figured iron of all sizes, for building works, bridges, waggons, etc., is in great demand; while their iron for clinches and cables are much sought after on foreign markets.

The same firm also manufacture iron hoops and rod iron for bossheaded bolts, besides Calleja's patented metal-sheet and miscellaneous plates for machinery.

A special foundry and set of workshops is set apart in their establishment for manufacturing cylinders and all stock employed in rolling mills.

We will have closed the list of Messrs Pierard frères et Co's undertakings when we have stated that they further construct merely metallic railways and tramways of various styles according to the bursting power of the metal employed. For this purpose it is Serres and Battig's patent they work upon.

We must next mention as one of our leading establishments the SOCIÉTÉ DES Forges et Laminoirs de

L'Alliance (The Alliance Forge and Rolling Mill Company), established at Marchienne-au-Pont, near Charleroi in 1865 and now conducted by Messrs Riche et Co who gave their name to the firm in 1867.

Messrs Riche et Co's factories chiefly turn out hoop irons for bales of cotton and wool, slitted iron and iron in bar of all merchant sizes and qualities. They also manufacture ⌊ I ⊤ ⌋ iron, iron or steel rails for tramways and other conveyances and generally speaking every description and size of figured iron. Their annual production amounts to 18,000 ton and the gold prize medal was awarded to them at last year's Paris Exhibition (1878).

There is much to be said also in favor of the sheet iron and steel produced by the Société anonyme d'Espérance et Longdoz for glazing paper and manufacturing buttons, springs, pipes, etc.

The Company whose seat is at Liège works all kinds of ores and can produce at very moderate rates.

Samples of its manufactures will be found in the Belgian department of the Sidney Exhibition.

In the wire manufacturing line, we find the chief producers in Belgium to be Messrs A. Dawans et H. Orban whose factories are situated at Liège.

Messrs A. Dawans et H. Orban manufacture rolled and drawn oiled fencing wire, bright, annealed, galvanised coppered, or tressed for cables. besides iron and steel drawn wire. Their wrought patent, cut and wire nails are much esteemed on foreign as well as on home markets.

The firm have also contributed to the Sydney Exhibition where samples of their produce will be found on show.

The most prominent producers of Bessemer steel in Belgium are the Société des Aciéries d'Angleur, (The Angleur Steel Work Company) established in 1871 by Messrs F. de Rossius Pastor et C° for the express purpose of manufacturing steel on the Bessemer process and whose seat is at Renory-Angleur (a suburb of Liège).

The *Société des Aciéries d'Angleur* employ six converters of six ton each. It would be difficult to find a better quality steel than wat they produce. Beyond asserting this fact we will endeavour to give it the support of practical evidence, by stating the manufacturing principles on which the Company work.

In the first place, instead of applying the metal to their manufacturing purposes immediately after it isues from the blast furnaces, they first of all re-cast it. This enables them to rid it of any matter whose composition is, in some respects, defective and besides this to give their produce exceptional intrinsic value, by submitting the cast metal to a careful analysis previous to the alloy which is to constitute actual steal being composed. The previous analysing of the cast metal further affords this advantage that it enables them to prepare their alloys in view of obtaining any kind of quality they choose (from standard cast iron, as described in the classification adopted at Philadelphia, up to extra-fine grained steel) before placing the metal into the cupolas or reverberatory furnaces for recasting.

The second characteristic circumstance to which we should draw attention is that all the bars cast by the firm undergo a powerful hammering. Of course the expense incurred through this additional operation is somewhat costly; but the final results amply compensate the outlay, as the mere fact of the refuse being extraordinarily slight obviously enough shows.

Lest this should not be sufficient to satisfy our readers as to the superiority of the steel produced by the Société des Aciéries d'Angleur over other produce, we will record one for two of the experimental results

yielded by the firm's steel rails, tyres and axles, on various occasions ;

Their *rail Vignoles* weighing about 77 lbs and 44 1/4 oz. to the yard, supported by two props one yard and two inches apart, bore for five minutes a pressure of over 24 tonweight without permanently preserving any outward mark.

The same sustained, unhurt, the shock of a rammer weighing over 1,100 lbs and falling from a height of 4 yards, 14 inches.

Their *rails for roads constructed on Hilff's system* weighing about 60 lbs to the yard and similarly placed successfully resisted, during a five minutes' trial, a pressure of over 15 ton weight. They sustained the shock of a rammer weighing over 660 lbs and falling from a height of 4 yards, 4 inches.

Rails weighing over 75 lbs to the yard, which the *Société des Aciéries d'Angleur* constructed for the Roman Railway Company, were found proof against a pressure of over 22 tonweight and did not show the least sign of breaking, when under a pressure of double that weight.

They resisted a shock as heavy as in the case of the Rail Vignoles.

The *wagon tires* manufactured by the Company for the Belgian Government are capable of sustaining a shock of about one tonweight and a quarter. The size of these tires, is as follows :

Diameter inside . . . . . 34 in. and a fraction
Width . . . . . 5 " " "
Thickness . . . . . One fifth of an inch
Height of the champignon... A little over one third of an inch.

The *axles* turned out by the *Société des Aciéries d'Angleur* for the Northern Spanish Railway proved equally successful, sustaining as they did blows from a rammer weighing over 1100 lbs. and falling from a height of 3 yards and 34 inches without breaking or even splitting. The size of these axles was as follows: Distance between each tree from the arms, 2 yards and

13 in.; diameter of the axle in the centre of the waist, 5 inches; diameter of the arms, a little over one third of an inch, and length of the arms, 6 3/4 inches;

These few examples selected out of a large number of the same kind will give competent men an idea of the properties of the Angleur steel.

In Australia where means of communication are rapidly extending, railway companies will not be at a loss to perceive what a saving they might realise by applying to the *Société des Aciéries d'Angleur* for their rails, axles, etc. as the most lasting of such manufactures that are to be found.

But the Company we allude to can supply other than railway companies' wants as the following list of their produce will show :

Foundry pieces : pinions, rollers' couplings and bolsters, bevel wheels, etc... Rails, tires, axles and various rolled plates, etc... forge articles; moulded and hammered plates, chased sheet-iron, trepans, files, embossed steel, etc..., cast iron (Philadelphia standard) for wires, nails, boiler plates, for chasing, forging, and manufacturing embossed plates; soft steel of every degree of strength for rails, and axles, gun barrels, machinery, etc... every quality of fine-grained steel for rails, tires, axles, springs, blackwork, hatchets, hammers, scythes, files, saws, trepans, etc...

The *Société des Acieries d'Angleur* export their manufactures to every part of the world and mainly to France, Italy, Germany, Spain and South America.

They made a splendid show at last year's Paris Exhibition where they were presented with the highest prize awarded for Bessemer steel manufactures-viz, the gold medal.

We now come to lead.

Messrs G. Dumont et frères' lead, zinc and silver works, established at Liége also occupy a most prominent position in their branch of Belgian industry.

Their manufactured lead is made very soft for rolling and the firm insure special properties to the metal intended for manufacturing white lead and lead crystals.

Messrs Dumont et frères' plates of zinc are of the best quality for rolling and their silver which is delivered in cast bars contains but an almost imperceptible alloy of foreign metal (something like two or three thousandth parts or so)

The same firm whose lead production is certainly more considerable than that of any other establishment throughout Belgium, and, perhaps on the Continent, purchases lead and zinc ores, ores in which both of these metals are to be found together and also silver ores, whatever may be the yield.

It will be easy to conceive from this what an important field lies open for an exchange of business transactions between Messrs G. Dumont et frères and a country like Australia where the soil yields such quantities of lead

In the Belgian department of the Sydney Exhibition will further be found the products of Messrs Edmond Lamal et Cie, of Brussels, a firm we are not mistaken in describing as the most important in Belgium for manufacturing sheet and pipe lead.

For the last four years, Messrs Edmond Lamal et Cie have been working with new machinery embodying the latest improvements and owing to which they are able to turn out no less than 10,000 kilogs (about 10 English tonweight) of manufactured lead per average day's work and thereby to compete with the largest establishments in Europe as far as concerns promptness of delivery and cheapness. The inward size of Messrs Lamal's lead pipes ranges from 1/8 to 6 inches and the width of their sheet lead from 10 English feet downwards.

This leads us to speak of a joint for connecting water or gas-pipes which may be considered, in its way, as the most perfect invention of our time. Before describing it, we may state that it is due to the great engineer, Mr Léon Somzée, of Brussels who, in the course of a few years, has attracted the attention of the scientific world by such remarkable achievements as a plan for carrying out the proposed sub-marine tunnel between France and England and a new screw-propeller which enables war or merchant ships to wheel round and avert destructive shells or collisions instantaneously.

Mr Somzée's joint consists of a simple ring of vulcanized india rubber which fits on to the opposite ends of two pipes so as to unite them beyond any possibility of rupture. The superiority of india rubber joints over leaden ones was proclaimed as early as 1847 by the English engineer Wicksteed, but it was never so plainly illustrated as when Mr Somzée first made a practical trial of his india rubber joint.

The extraordinary properties which the inventor claimed for his system were all found to be real and these may be stated as follows : Mr Somzée's joint is more simple than any other because it consists of a single piece; it is more durable, because, being of india rubber and only a small part of its surface being outwardly exposed, it resists all atmospherical influences; it is safer, because being more pliable than metal, it can follow every movement of the pipes without breaking or causing the contents of the pipe to escape under the pressure of the ground; it is much more convenient in every way, because, when the pipes have to be repaired, they can be disjointed with as little damage as possible, and it is very less expensive, because it can be formed with greater ease and speed and within a very much smaller compass.

In support of this we may mention the fact that two ordinary mechanics working without any tools can lay and connect 800 yards of M. Somzée's water or gas-pipes within a couple of hours whereas, the laying

of pipes connected by leaden joints takes thrice as much time, besides having to be performed by experienced workmen provided with special tools; while another consequence of the difficulty attending such labor is that it has to be achieved in deep and wide trenches, whereas M. Somzée's joint and pipes can be worked within an exceedingly narrow space. What an immense saving of time and money is realised by such an invention can therefore be easily conceived.

When we have added that the inventor's joint can be adapted to any kind of pipe whatever and not solely to pipes of his own make, no one will wonder at M. Somzée's system having been adopted throughout the continent. The pipes in the Brussels Gas Works are provided with it; 15,000 yards of pipe connected by the india rubber joint have been laid down at Catane (Sicily) within six weeks by workmen who had never handled leaden pipes before; vast water and gas works have been supplied with M. Somzée's system at St-Petersburg, Rostow, Athens, Bordeaux, Dunkerk, Mons, Rotterdam, etc. and experience has shown that after fifteen years' wear it does not loosen or give way, even when under a pressure of 12 atmospheres for gas and of 22 atmospheres for water pipes.

There are but few countries in Europe which, notwithstanding such marvellous results, still cling to the old, costly and inconvenient leaden joint; but, in Australia, where habit and routine have not yet become a second nature, there is every prospect of M. Somzée's joint being soon put into general use and this is the reason why we have taken the pains of commenting upon M. Somzée's system at same length.

This is the right place for speaking of a new metal or rather of a new alloy devised a few years ago by Messrs Montefiore Lévi and C°, of Val-Benoît, near Liége, and which, from the very outset, proved suc-

cessful enough to induce many unscrupulous foreigners to claim it as an invention of their own. We allude to what is known in Belgium as *bronze phosphoreux* and was christened " phosphor bronze " by the English and Amarican scientific journals whose attention it first attracted.

By what process phosphor bronze is obtained we cannot tell, for this is the secret of the inventors. But we may briefly state its properties as well as the objects it is intended to carry out.

Phosphor bronze is harder than common bronze and its bursting power is greater; besides this and what is perhaps still more worthy of notice, it shows outward-signs of giving way, by swelling and tearing, when under overpowering pressure, instead of suddenly bursting as is the case with steel. Experiments made in London, Vienna and other places have shown that its strength of flexure and resistance to pressure is superior to that of ordinary bronze and equal to that of steel, while it resists torsion better than any other metal known.

Another of its advantages is that it can be re-melted, when worn whereas steel is almost valueless, when arrived at the same point. At last year's Paris Exhibition, Messrs Montefiore-Levi et C° had on show a shaft made of their phosphor bronze which appeared almost as good as new, although it had been employed five years and a half during which time it had rolled no less than 25,000 ton of black and sheet-iron. This will suffice to give competent authorities an idea of the saving which phosphor bronze must procure for manufacturers who employ it instead of ordinary bronze.

The purposes for which phosphor bronze can be used are numberless. The new alloy was first applied to manufacturing guns and was found much more appropriate to such work than ordinary bronze, inasmuch as it increases the toughness of the gun without diminishing its tenacity, besides preventing the rifling from getting ont of shape or the smooth parts of the gun from being injured by remnants of burnt powder

Phosphor bronze is also employed for manufacturing cartridges, revolvers, Lecomblain's and Lefaucheux's guns. Phosphor bronze guns are especially fit for warm climates, because the alloy is very much less subject to oxidisation than any other metal.

In blast furnaces, pipes made of phosphor bronze last twice as long as others. One of the great Belgian railway Companies, the *Grand Central Belge* employs phosphor bronze chairs and the new alloy which is very easy to roll gives excellent sheets for the bottoms of ships, as it perfectly resists the action of sea-water. It is also employed for making nails, cables in mines, girth-buckles, rolled and annealed wires, valves, slides, pins, pens, bells, etc.

Messrs Montefiore-Lévi have sent samples of this remarkable alloy to the Sydney Exhibition where an inspection of it will no doubt lead to its introduction into a great many Australian manufactures.

Let us now point out a few of the firms that turn the metallurgical wealth of the country to account for producing machinery, and articles in metal.

The " Belgian Railway Machinery and Working Stock Construction Company " — Compagnie belge pour la construction des machines et matériel de chemin de fer — established twenty years ago at Brussels under the management of M. Charles Evrard, ranks amongst the leading institutions of the kind in Europe. The Company's works are performed in two vast factories one of which is situated at Molenbeek-St-Jean (a suburb of Brussels) and the other at La Croyère, near La Louvière, in the province of Hainaut. These establishments employ together over 1,600 hands.

The *Compagnie Belge* chiefly attends to the building of railway and tramway rolling stock such as locomotive engines, passengers' carriages and merchandize vans, stationary working stock for railway stations, metallic bridges, iron wheels wrought by

hydraulic power, etc. Their locomotives are remarkable not only as a whole, but in every one of their details, for there is not even to the smallest part of them which has not been improved and brought up to the height of perfection as regards build, distribution of steam-power and general convenience.

This may be said of all the COMPAGNIE BELGE'S products which are favorably known and appreciated not only at home and in Russia, Germany, Turkey, Spain and other parts of Europe but even as far as in Egypt, in India and all over America.

Since its foundation, the Company has built railway saloon cars for the Queen of England, the Queen of Spain, the Emperor of Russia and several other eminent sovereigns, besides supplying the Belgian Government Railway, the French Paris-Lyons and Mediterranean line and several of the greatest English railway companies. To the same firm also are due the first of Mann's sleeping cars that appeared on the European continent.

The Company works on such a large scale and with such improved machinery as to be able to turn out annually, in rolling stock alone, as many as 50 or 60 locomotive engines, about 1,500 wagons, from 150 to 200 passengers' carriages and from 100 to 150 tramway cars.

The Compagnie Belge have contributed to three of the largest International Exhibitions held in late years, namely :

The Paris Exhibition in 1867, where they carried a silver and a gold prize medal;

The Vienna Exhibition, in 1876, where the medal of progress was conferred upon them;

And finally last year's Paris Exhibition, 1878, when they had to compete with the most formidable rivals notwithstanding which they were awarded the highest prize obtainable, viz-the gold medal.

Such unparalleled success cannot but enhance the deserved and ever growing reputation which the *Compagnie belge* enjoy both abroad and at home and

which entitles their works to the careful consideration of Australian railway Companies.

Next to the *Compagnie belge* comes the SOCIÉTÉ ANONYME DES ATELIERS DE LA DYLE established at Louvain under the management of Mr Durieux and who construct all the narrow railway wagons and carriages employed in France, Germany, Spain, the Netherlands, Italy and most ultra-marine countries.

The object of narrow railways is generally to effect a saving or to answer topographical requirements, for instance, in cases when the railroad has to ascend heights or to run down sloping ground.

The SOCIÉTÉ ANONYME DES ATELIERS DE LA DYLE construct their trains with a view to answering both these purposes. Their wagons, although made of the best material are the cheapest that can be had, and the small proportion of their dead weight to the necessary weight renders them invaluable for travelling over uneven land. The firm have taken out a patent for a new electric brake and independently of wagons annually manufacture at least 15,000 iron wheels and axles for railways and tramways. The firm have been awarded the highest prize at Vienna, Philadelphia and Paris.

At a stone's throw from the Cockerill works stands the splendid factory of Mr CHARLES BEER started at Jemeppe near Liège by the three brothers Beer who had taken their degrees at the Liège engineering Academy.

With threefold experience and science at their command the three engineers determined that instead of limiting their exertions to manufacturing vulgar imitations of current machinery, they should endeavour to assert their superiority by improving every type of

machinery existing, besides devising apparatuses of their own. Messrs Beer carried out this idea so successfully that they soon secured for themselves a prominent position and when, in 1878, they took part for the first time in an International Exhibition, they were awarded two gold medals which placed them above many of the wealthiest and oldest firms in Europe.

M. Charles Beer has forwarded several of his manufactures to the Sydney Exhibition. Yet it may be well to give a short list of what the firm chiefly produce. In running over this list, Australian readers must recollect that almost every piece of machinery we mention bears some improvement or the other over similar concerns generally used : MACHINERY AND WORKING STOCK FOR MINES AND COLLIERIES such as drawing up, water and air compressing engines, steam, pumps ventilators, wagons, air or steam-capstans, etc.

WORKING STOCK FOR MANUFACTURING FIRE PROOF PRODUCE such as kneading-troughs, bruising mills, separating trommels, etc.

WORKING STOCK FOR PREPARING COAL AND MANUFACTURING COKE such as grinders, washing machines, endless screws, special wagons, etc.

TOOL ENGINES FOR WORKING METAL such as turning-lathes, planing, filing, mortising, boring machines, etc.

WORKING STOCK FOR MANUFACTURING CANE OR BEET-ROOT SUGAR and other MISCELLANEOUS MACHINERY such as locomobiles, water weels, steam boilers, hoisting machines, railway working-stock, steamboats ballast-lighters, etc.

We will not revert again to the machinery or parts of machinery manufactured by the SOCIÉTÉ COCKERILL, the SOCIÉTÉ DE MARCINELLE ET COUILLET, the SOCIÉTÉ DES ACIÉRIES D'ANGLEUR, Messrs MONTEFIORE-LEVI ET Co, PIERARD ET Co, etc. But we may state that in the machinery department at the Sidney Exhibition will be found the boilers for railway. ships, factories, etc., manufactured by Mr E. PETRY-CHAUDOIR, of Liège

a firm of wild-world repute and the fire engines exhibited by Messrs C. Thiriart et Cº, likewise of Liège. These fire engines which embody the very latest improvements are remarkable as to price, ranging as they do price 60 to 18 pounds (all accessories included) according to size.

We will also say a few words of Belgian and principally of Brussels carriage-makers whose vehicles are reputed on the Continent as much, in their way, as French kid gloves, Sheffield knives, or Russian furs. Our leading manufacturer in this branchis M. Auguste Constantin of Ixelles (Brussels) who manufactures, victorias, landaus, breaks, four-in-hands, dog-carts, and every style of carriage known.

What specially entitles M. Constantin to the custom of people of fortune in Australia is a new patented carriage for which he obtained the highest prize at the late Paris Exhibition This is a brougham provided with a set of hinges and spring bolts which reduces the external volume of the carriage renders the vehicle lighter than anybody who has not seen it can imagine and gives it a quite princely gait. Of course carriage folks must realise a great saving by using a brougham that flies and tears away, while sparing valuable horses the strain which heavier carriages put upon them and which very soon knocks them up.

Besides this advantage, M. Constantin's brougham is very much more confortable to ride in, the elasticity of the springs preventing the noisy and disagreeable cracking that grates upon the inmates'ears in most other vehicles, while an elastic band placed inside closes the doors automatically, thus sparing the traveller the trouble of shutting them or the mishaps and accidents which occur when he forgets to close them. Since the Paris Exhibition, this invention has been welcomed everywhere on the Continent and orders have been forwarded to the maker even from Havannah and other remote parts.

Although M. Constantin has failed to send one of his broughams to Sydney, our description of it will no doubt satisfy our Australian readers as to its superiority over most other broughams imported into New South Wales.

In iron safe-making great progress has been made by M. G. Hoorickx, of Brussels. M. Hoorickx having perceived that fireproof safes in sheet iron still afforded a certain scope for the assaults of house breakers has invented a concern so ingeniously contrived that any attempt to break it open must necessanly fail, whatever tools are used for the purpose.

M. Hoorickx'safe is a kind of cage, the outer coating of which consists of thick and hardened steely-iron forming, as it were an armour-plate such as protect modern war ships from shells. Betwen this and the inner coating, lies a block of fire-proof matters preventing the transmission of heat, while the safe itself, similarly wrapped in fire proof matters, hangs within and is separated, on all sides, from the inner coating of the case, by an air space.

A safe constructed on this plan is on show in the Belgian department of the Sydney Exhibition and will be found the most perfect contrivance that could have been devised for keeping money and papers beyond the reach either of fire or thieves. M. Hoorickx supplies the most important firms and private dwellings in Europe with his safes which range in price from 36 l. st. upwards.

The progress of archeological taste will soon bring about in Australia, the introduction of artistic locksmithery which is admirably manufactured in Belgium by M. Prosper Schryvers of St-Gilles (one of the suburbs of Brussels).

A piece of work of the kind which Mr Schryvers sent out to Philadelphia in 1876 excited great admiration in the United States. This piece of work consisting of a door pannel in wrought iron the design of which represented a vine with the leaves, branches and fruit wrought by the hammer, might well have been placed in the fine art section, as the jury of the Philadelphia Exhibition themselves stated, while recommending in their report, that the first prize should be awarded to the manufacturer. The Pennsylvanian Industrial Art Exhibition purchased this remarkable pannel and since then a number of Mr Schryvers' wrought-iron art works, bearing designs in the style of middle age and *Renaissance* art have made their way to America.

It was also Mr Schryvers who manufactured the beautiful wrought iron furniture for king Leopold's saloon at last year's Paris Exhibition. For Australia, Mr Schryvers has already manufactured several balconies and house fittings. This is a first step towards a general adoption of his works in New South Wales.

Messrs Tremouroux frères et Co's household and kitchen utensils will probably be regarded as novelties by many of the visitors to the Sydney Exhibition. Of old, such articles were made of common earthenware and more recently of copper; but earthenware was unsightly and fragile and copper so corrodible as to poison the food prepared in it.

Messrs Tremouroux frères et Co who give employment to nearly 300 workmen, in an enormous factory fitted with improved machinery and situated at Brussels, make their household and kitchen utensils of wrought, enamelled, varnished or stained iron which is free from the defects inherent to copper, while being cheaper, more lasting and very much more agreeable to look at.

Indeed, some of their saucepans, tea trays and other manufactures in sheet iron, enamelled over with every

kind ofdesign or ornament, are not only the most durable of kitchen and household ware, but sweet little pictures that can appear on a dining table and be mistaken by the guests for valuable china articles.

The low price at which they can be produced places them within the reach of the most humble households and there is hardly a country in the world that does not send to Belgium large orders for them This is a still more forcible argument in their favor than the numerous prize medals and other awards they have been the means of securing for Messrs Tremouroux frères at the London, Dublin, Porto, Havre, Amsterdam, Vienna, Brussels, Philadelphia and Paris Exhibitions in 1862, 1865, 1867, 1868, 1869, 1876 et 1878.

The demand for wrought iron utensils is so great that two large Belgian firms are able to manufacture such articles on a large scale without one of them suffering from the other's competition. We have mentioned one; the other is that of Messrs Glibert et C°, of Brussels, who also employ 300 hands, while their factories are fitted with a steam engine of 100 horse-power which sets in motion a number of smaller apparatuses. Eight ovens are engaged night and day in enamelling and the firm's production in saucepans and other domestic utensils is so enormous that one would think it sufficient for the wants of the whole world.

Besides the exquisite taste which Messrs Glibert et C° display in the enamelling branch of their work, they deserve great credit for the attention they pay in combining the raw materials so as to exclude all corrosive matter from their cooking apparatuses. In order to arrive at this, they roll their own iron, varnish their own ware and perform, by themselves, every bit of the work connected with their branch-after which, they hand over their manufactures to professional men who chemically analyse them, in order to reject them

when defective. This is an important consideration and one which has probably been the most effective in inducing the juries of the Paris, Vienna, Brussels, London and other Exhibitions to confer upon Messrs Glibert et C° the highest prizes awardable. Samples of the firm's ware will be found at the Sydney Exhibition.

CHAPTER THE SECOND.

Weapons.

We may assert, without fearing any contradiction, that Belgium is the greatest weapon-producing country in the world. Liége which is the principal district where this branch of industry is cultivated supplies most of the great armies in the world and this will become a tangible fact for everybody when we have stated that the three fourths of weapons, sold abroad as German, English or French manufactures, are articles made in Belgium but disguised under foreign trade-marks in different parts of Europe (1). Not only do other countries apply to us for our new weapons, but many of them, such as Germany, England, Italy, the Netherlands and the South American Republics send their old muskets and other weapons to Liége either to be repaired or to be transformed into breech-loaders or other improved shapes. In support of this we may state that no less than one million and half sterling worth of old weapons were forwarded to Liége for such a purpose from 1876 to 1878.

With regard to new weapons, our exports during

(1) Most of the weapons employed in the English colonies and bearing the mark of " The Crown „ or " The Tower „ come from Liége.

1875 alone amounted to 702,928 l. st., and must have largely increased since, through the Eastern war and the English campaigns in Afghanistan and South Africa. So little, on the other hand, do the Belgian people depend upon foreign manufactures, that the amount of these imported during the same year (1875) only reached 296,684 l. st., although the Belgian Government has an army of 300,000 men (1) to equip, not to speak of the immense number of weapons supplied to sportsmen.

Our superiority in weapon making arises from three different causes. In the first place, the abundance and cheapness of steel, iron and other raw materials enables our manufacturers to produce at from 20 to 25 per cent lower rates than elsewhere. In the second place, Liége is one of the few places where weapons are manufactured by machinery, our work being therefore much better than what is done by hand ; and in the third place our manufacturers are so numerous and so admirably organised as to be able to execute orders more promptly than any other country — which is a most important point in contingencies such as weapon manufacturing has frequently to meet.

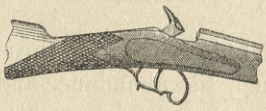
Our producers turn out all kinds ofweapons-both for sport and for warfare-and Germany alone, with its great manufacturer, Her Krupp, can compete with us as regards heavy guns. Our ornamented muskets, revolvers, etc , ave unrivalled and our ammunition, cartridges, copper caps, etc., are employed all over the world. To conclude we may state that the Belgian law compells our manufacturers to submit all their weapons to Governement trials before delivering them to trade.

Our producers ave so numerous, as we hare already said, that it is impossible for us to mention them all.

(1) The civic guard or yeomanry comprises about 193,000 men. and the standing army 103,124, divided as follows : Infantry, 70,737; Horse, 7,924 ; Artillery, 15,234 ; Engineer-corps, 2,685 ; Other-corps, 6,544.

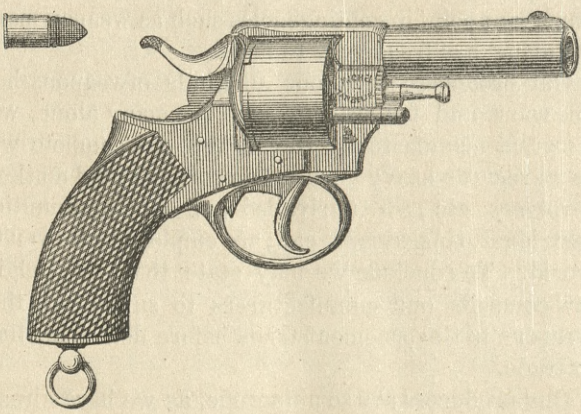
We will therefore merely give the names of one or two of them.

Only three of the great Liege firms have taken part in the Sydney contest. The first is M. MICHEL TAMBEUR who has aimed at laying before the public's eyes



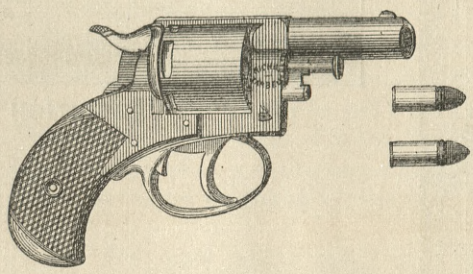
substantial and thoroughly well finished rather than pretty and tinsly weapons such as are often sent out to Exibitions for mere show.

Australians will probably never have seen before such strong and good weapons at such extraordinary low prices. One of M. TAMBEUR's revolvers is quoted at 4 shellings and one of his plain-barrelled muskets at

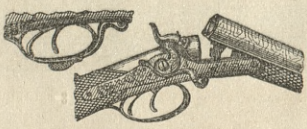


the same price, both bearing the Belgian Government's proof stamp. Indeed, all the weapons exhibited by M. Tambeur, either ordinary revolvers bull, dogs, constabularies, revolvers with cartridge-pickers, plain or double-barrelled percussion muskets, central fire mus-

kets of various systems have similarly undergone Government trials. The firm's sporting rifles like all their other weapons are most commendable, not only



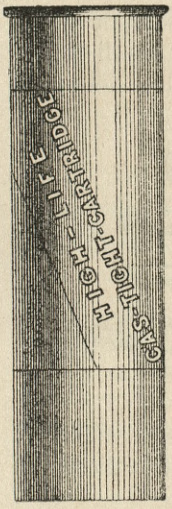
on account of their cheapness, but also because of their solidity and finish. The cuts on this page represent some of them.

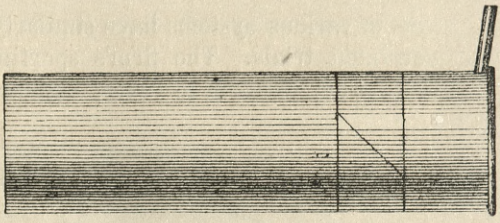


M. Michel Tambeur already exports his manufactures on a large scale and there is no doubt that his show at Sydney will secure for him a wide connection in the Australian colonies.

Messrs J. Ancion et Cº whose factories are also established at Liége supply most European armies with breech-loading rifles, revolvers, muskets, etc. The amount they produce is enormous and their reputation wide-world, the firm being one of the oldest in Liége.

There are several cartridge factories in Belgium. The most important is the military and sporting ammunition manufactory of M L. Bachmann, contractor to the Government and whose works are situated at Etterbeek, near Brussels. M. Bachmann's cartridges engravings of which we lay before our readers' eyes, as being particulary suited for hunting, are manufac-





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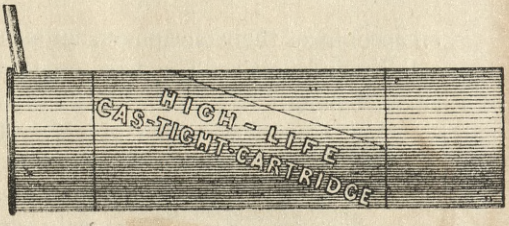

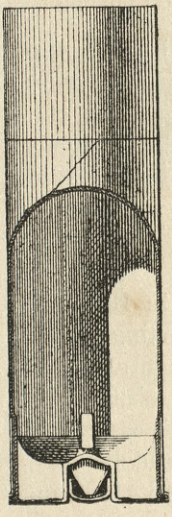

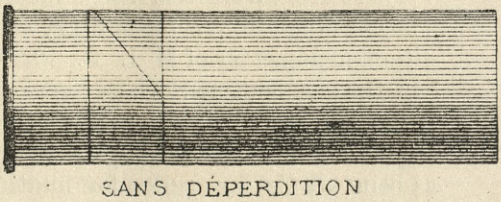

SANS DÉPERDITION

tured without the need of any internal strengthening and thus allow of the heaviest possible charges being used. Their outer covering is prefered to any other made as it presents greater solidity, does not oxidize (communication with the powder being completely cut off) and offers perfect resisting surface, even in guns whose chambers have been worn by constant use.

M. L. Bachmann's *High life cartridge case* being absolutely damp proof is particularly fitted for field sports, especially when a good deal of ground has to be got over.

The central fire cases ignite with great certainty. In a thousand of these cases tested with ordinary fire arms not a single case missed fire. The recapping operation is very easy and does not require any special application.

The firm's military ammunition comprise cartridges for Comblain, Martiny-Henry, Snyder (Bachmann Boxer System) and other rifles, Gatling guns, revolver cartridges, pin and central fire wadding, etc., all of which can compete with the best of foreign manufactures as, the silver medal awarded to M. L. Bachmann at last year's International Exhibition in Paris amply testifies. The firm only transact wholesale business and supply the most important military States.

Next to M. Bachmann, come Messrs Charles Fusnot et C° who hold a vast factory at Cureghem (a suburb of Brussels) and are able to turn ont about 150,000 cartridges *per diem*.

The firm's speciality consists in war ammunition (cartridges for Remington, Martiny-Henry, Snyder rifles, etc.), but they also produce ammunition for small muskets and revolvers.

CHAPTER THE THIRD

Glass

Only such countries where fuel is cheap and abundant can produce glass on anything like a large scale. Belgium is one of the few nations which, in this respect, are particularly favoured. Although extending over no more than 11,202 square miles, the country produces as much as 15 million ton of coal per annum and engages 1800 steam-engines equal to 100,000 horse power, in working mines. This appears all the more startling, when one reflects that New South Wales which extends over an area of 323,437 square miles yields little more than a million and a half tons per year.

Although 12,650 steam-engines consuming about 2 lbs, 3 oz. of fuel per hour are in motion in Belgium, the production in coal much exceeds national wants. The consequence is that coal must be cheaper in Belgium than in many other parts of the Continent and that Belgian glass manufacturers work at a great advantage over most of their foreign competitors. The fact that the United States Government protects native produce by levying an import duty of 60 per cent *ad valorem* on Belgian plain and crystal glass is a striking piece of evidence in this direction.

But with regard to raw materials employed for manufacturing glass, Belgium's wealth is not confined to fuel. Flinty sand — which is one of the main ingredients of glass paste- cannot anywhere be found in larger quantities than in Belgium, and one of the characteristics of Belgian sand is its remarkable fineness and softness. Let any one, for instance, compare Belgian with English or American plate glass and he will easily perceive the difference caused by the nature of the ingredients respectively used for either. Belgian plate glass is thoroughy clear and bright; English and American manufactures have a greenish tint due to the comparatively large percentage of iron contained in

the sand employed for making them. The advantage which Belgian manufacturers owe to native sand, probably accounts for the fact that, at the last Paris Exhibition, France was the only country that came forward to compete with Belgium, in the plate glass department.

As to the manufacturing processes, they have been carried in Belgium to the very highest degree of perfection. The glass industry is chiefly exercised at Charleroi, Jumet, Roux and Gosselies, in the province of Hainaut, in the very midst of the principal coal mines and in the best district, geologically speaking, that could have been selected, as the greater part of the soil in it consits of the silicious sand we have just spoken of.

At present the number of operatives who gain their livelihood in Belgian glass works is over 12,000 and the cheapness and abundance of raw materials enable their employers to pay them unusually heavy salaries without even bringing their net prices as high as foreign rates. Glass making is the almost general occupation in the neighborhood. Most of the male population are trained for it from childhood; they are sent into the factories, as assistants, immediately after they leave school, and so grow up to be the most able mechanics in the world, especially with regard to the blowing and spreading processes which they perform with wonderful skill.

The quantities of fireproof matter produced at Andenne, S^{t} Ghislain and in other parts of Belgium also furnish our manufacturers with cheaper and better material than can be found elsewhere for building furnaces.

The total number of glass factories in Belgium exceeds seventy. 60 of these, containing 213 ovens, with 6 or 8 crucibles each turn out window glass-which is the kind of glass the country most excels in manufacturing. French glass is generally as pure but very much thinner; and the spreading process is far less perfectly practised than in Belgium, in spite of the latter producing very much larger sizes. The total Belgian production, as concerns window glass, reaches from 87,520 to 93,000 tonweight, say from 16,350,000

to 17,440,000 square yards worth a little over, 350,000 l. st. The nine tenths of the production are exported to America, England, Germany and other parts of Europe.

There are about half a dozen crystal glass works in Belgium. These, although few in number, are very powerful, as regards the quantity they produce. Our crystal articles are remarkably clear, sound, elegantly shaped and lower in price than English flint glass which, although as good, is not only more expensive but less cleverly engraved. The six establishments that turn out this sort of manufacture produce an aggregate amount of 8335 tonweight worth altogeter 320,000 l. st.

Belgium further possesses 6 plate glass works- as many as there are in France. Of late years, our manufacturers have made such progress in this branch that they are rapidly taking the place of the famous French *glaces de Saint-Gobain* in public estimation and on foreign markets. They are specially in demand throughout England where native manufacturers produce little else than blank or rolled plate glass of inferior quality for hot-house coverings, floorings, etc... The total production of plate glass in Belgium amounts to about 327,000 yards worth about 180,000 *l. st.*. three parts of which are imported into Great Britain, the United States, etc...

We will now proceed to point out the principal Belgian firms that exercise this branch of industry :

The Verreries de Mariemont. (*The Mariemont Glass Works*) rank amongst the most important in the country.

The latest mechanical improvements have been introduced in the factory ; one of them is the adoption of Boëtius' patent gas furnaces of which we spoke above and which enable the firm to produce exceptionally fine glass. The *Verreries* de *Mariemont* annually turn out as much as 6 or 7 million square feet

of window glass of every kind, every size and every possible thickness.

The articles which the firm have sent to the Sidney Exhibition comprise glass of every current size and of different thicknesses - bent, fluted and unpolished, and tiles or panes of different shapes and shades.

Besides its inherent qualities the Mariemont window glass is reputed all over the world for the special way in which it is packed.

The firm are represented, on Australian markets, by the very same agents appointed for the *Cristalleries du Val St-Lambert* which we give below.

Another of the firms with which Australians will be able to carry on most easy and profitable transactions is that of Messrs L, Lambert et Cie, proprietors of the *Verreries des Hamendes* (The "Hamendes Glass Works") established at Jumet in the district of Charleroi.

An almost complete set of Messrs L. Lambert et Co's products, comprising window glass, glass for photographic plates, colored, fluted and plain enamelled or *mousseline*, will be found in the Belgian department of the Sidney Exhibition. Notwithstanding, it may be well to state that the "Hamendes Glass Works" are known to produce to perfection the largest-sized panes it is possible to blow. Such panes are excellent substitutes for plate glass shop-fronts and indeed are employed for the purpose in England, in America and in several of the countries supplied by MM. L Lambert et Cie.

In order to promote trading with Australia, the above-mentioned firm have determined to deliver free of charge alongside ship at London all goods adressed to that part of the world, while so much attention is paid to the packing that their articles never incur the slightest damage, however long the distance they have to travel over. As compared with establishments of the same kind, the "Hamendes Glass Works" stand amongst the most important in Europe. They employ

no fewer than 280 hands and so great is the demand for their products that not a single of their furnaces has stopped working in spite of the distress which has prevailed in commercial centres since 1874.

Australia is already well acquainted with the window glass supplied by M. Léon Mondron's *Verreries de la Planche* ("La Planche Glass Works") situated at Lodelinsart, near Charleroi.

As regards the whiteness of tint, the care taken in the spreading process, the thickness and the evenness of the sheets, M. Léon Mondron's produce stand almost unrivalled, especially as the firm take as much pains about their work when business is slack as when the demand is great.

The following list of Exhibitions at which the *Verreries de la Planche* have obtained prize medals thoroughly bears out our opinion : London 1862, Dublin, 1865, Porto, 1865, Paris, 1867, Hâvre (*hors concours*), 1868, Amsterdam, 1869, Vienna, 1873, Santiago (Chili), 1875, Philadelphia, 1876 and Paris 1878. At Sydney M. Mondron exhibits panes of window glass of every size and thickness from 13, 16, 21, 26, 27 oz, upwards. Particular attention is also paid in the firm's factory to the packing of goods, in order to avoid breakages during transhipment and long passages.

Prominent amongst window glass factories also stand the *Verreries de la Coupe* (" La Coupe Glass Works ") established at Jumet and known as the largest establishment of its description in the world.

Besides all kinds of coloured and fancy glass they turn out window glass of all sizes and weights up to 9 feet 6 inches in length and 4 feet 5 inches in width.

Had M. H. J. Bivort, owner of the " Coupe Glass-Works " failed to exhibit his produce at the Sydney Exhibition — which, however, he has not — what value is set upon them might easily have been inferred

from the simple fact that M. Bivort has been made a knight of the Order of Leopold by the Belgian Government, while the following prizes have been awarded to him at the latest International Exhibitions : London 1851 and 1862, prize medals; Dublin, 1865, prize medal; Paris, 1855 and 1867, silver medals; Vienna, 1873, diploma of honor and Paris 1878 gold medal.

Mess^{rs} A. Fourcault-Frison and C$^{o's}$ factory (*Verreries de Dampremy*) which is situated at Dampremy, in the district of Charleroi, also ranks amongst the oldest glass Work in Belgium.

It was founded in 1836 and has since carried prize medals at all the International Exhibitions held in Europe and in America.

It especially produces window glass, samples of which will be found at the Sydney Exhibition, and enjoys deserved credit for its large sizes in all qualities and thicknesses.

The most important of our crystal glass manufactories is the *Cristallerie du Val-St.-Lambert* (The Val St.-Lambert Crystal glass Works) situated at Val St.-Lambert, in the vicinity of Liége.

No fewer than 1800 hands are employed in this huge establishment the manufactures of which comprise :

Crystal glass and semi-crystal glass ware, plain, cut, engraved, stained and gilt;

Crystal glass mouldings, which constitute one of the firm's specialities;

Colored crystal and semi-crystal glass ware;

Handsomely cut glass ware;

Every kind of gaslight or lamp fittings in cut, obscured, engraved and bone glass;

Lenses for the Navy;

Common ground glass ware;

Vases and other articles in *albatrine* (plain or ornamented in every style).

The *Cristallerie du Val-St.-Lambert* have agents at the following places in Australia :

At Melbourne	. . . . .	for Victoria.
» Sydney	. . . . .	» New-South-Wales
» Brisbane.	. . . . .	» Queensland.
» Dunedin and » Auckland	. . . . .	» New-Zeeland.

and are represented in South Australia under the name of " D. & W. Murray " by Messrs Bright Bros and Co.

From this it will be seen that the firm have already a large connection in most of the Australian States.

The manufacturing of plate glass which, as our readers are now aware, is carried on on a very large scale in Belgium, lies almost exclusively — we might say entirely — in the hands of the AGENCE GÉNÉRALE DE VENTE DES GLACERIES BELGES whose offices are situated at nº 7, rue Jericho, Brussels, while they command factories all over the country.

The most important of these is the *Manufacture de glaces de Ste.-Marie d'Oignies* which annually turns out as much as 350,000 square feet of cast plate glass, either silvered or blank. This factory principally produces large sizes, and manufactured for last year's Paris Exhibition one of the tallest and broadest mirrors that had probably ever been seen. (It measured 14 feet and 6 inches in height and 11 feet and 5 inches in width, in spite of which not a single flaw or defect could be detected in it).

Next comes the *Compagnie des glaces de Floreffe* established in 1853 and also working on an enormous scale with Siemens' patented ovens. Its production may be estimated at about 250,000 square feet per annum.

The firm's third factory known as the *Société anonyme des glaces et verreries du Hainaut* is situated at Roux and turns out all sizes. It is fitted with

sixteen steam-engines aggregating 500 horse-power and turns ont yearly about as great a quantity as the last named Glass Work.

The *Société anonyme de Courcelles pour la fabrication des glaces* manufactures all kinds of plate glass, but especially bevelled glass, while the

Société anonyme des glaces d'Auvelais, which was only started about a year and a half ago, is already called upon to manufacture about 100,000 square feet of plate glass ware per year.

With such a powerful organisation comprising five immense establishments which turn ont enough to supply half the globe with every description of plate glass imaginable, it is not surprising that the AGENCE GÉNÉRALE DE VENTE DES GLACERIES BELGES should transact almost as much business as all the other firms in Europe put together. The manufacturing of plate glass is one of the great sources of Belgium's industrial wealth. England and America, as we have already shown, purchase enormous quantities of it, especially in best qualities and there is not a place in the world, however remote, where its reputation has not been re-echoed.

The AGENCE GÉNÉRALE DE VENTE DES GLACERIES BELGES have naturally contributed to the Sydney Exhibition where visitors will find samples of their rough glass in all thicknesses for roofings and floorings, blank polished glass for glazing and large shop-fronts, thick or thin plate glass, tinned, silvered, bevelled, engraved glass, glass door plates, scuttles, etc. They already transact a good deal of trade with Australia where they are represented by the following agents :

Sydney.... Messrs Montefiore Joseph et C°.

Melbourne... Messrs Renard frères et C°.

ERRATUM. — After going to press we find in the above notice a serious mistake which we cannot allow to go abroad unrectified. The figures showing the amount of production of the several glass factories worked by the AGENCE GÉNÉRALE DE VENTE DES GLACERIES BELGES were inadvertently borrowed from tables published ten years ago — at a time when the Company's production was infinitely smaller than what it is now. At the present day, the aggregate amount of plate glass turned out by the factories of Ste-MARIE D'OIGNIES, FLOREFFE, du HAINAUT, de COURCELLES and d'AUVELAIS exceeds 4 MILLION SQUARE FEET. Nor are any of these factories' functions confined to the production of a special kind of plate glass, as erroneously stated above. EACH of them manufactures ALL the different sorts exhibited at Sydney by the AGENCE GÉNÉRALE DE VENTE DES GLACERIES BELGES and enumerated in the last paragraph of the foregoing notice.

CHAPTER THE FOURTH.

CERAMIC PRODUCE, FIRE-PROOF MATTER, STONES, BRICKS, ETC.

Ceramic produce as applied to the manufacturing of tiles and bricks play a conspicuous part in Belgian industry. The principal firm who attend to this branch of work is that of Messrs L. MAERTENS et ED. DU WELZ whose works are situated at Stekene, in Eastern Flanders and known as the Tuileries Ste-Marie (St-Mary Tile kiln).

Messrs MAERTENS et DU WELZ manufacture Dutch-shaped jointing tiles, either red blue or glazed over, and which are constructed so as to be laid in diagonal direction. They also produce massive or hollow bricks made by machinery and flagging stones of every possible size.

The reasons which make the firm's articles superior to any other on the Continent are many : In the first place, Messrs MAERTENS et DU WELZ employ for their raw material a kind of clay which no other but Belgian soil is known to yield, while the machinery they have fitted their kiln with, being of the most improved description, they are in a position to produce articles it is impossible to cope with, either in point of clearness or durability.

The very shape of their diagonally set jointing tiles compells the water to run down the roofs of houses without getting through grooves into the garret. The firm's ordinarily-shaped Duch tiles are also remarkable as to finish. Their compressed bricks are particulary fitted for building facings of houses. The deep red hue which characterises these gives a magnificent appearance to houses and they are much employed for the purpose on the Continent, in England and in the Colonies.

Again, Messrs Maertens et Du Welz's hollow bricks are prefered to any others for laying the foundations of buildings erected on damp ground. Their hollow-

ness prevents the dampth from rising, so that they perform as it were a kind of natural underground drainage which not only preserves the building from wet but causes a great saving in many other ways. Another advantage of these tubular bricks is that they can be employed for constructing wainscoats and thin walls. Being hollow they prevent the transmission of sound from one room to another and consequently spare a good deal of annoyance and trouble to next- door neighbours.

The firm's pressed flaggingstones are as clear as cement and far more substantial, for this reason that being made wholly of good clay, they resist wear and tear for any length of time, whereas cement flagging stones are composed merely of a slight outer coating of cement with a mixture of very weak materials beneath, so that when the cement outer-coating begins to wear out, it becomes necessary to renew the whole of the flooring- which involves great and constant expense. Messrs Maertens et Du Welz's articles can, on the contrary, be used as long as a bit of them remains.

A further saving is realised by employing the firm's jointing tiles. Other tiles have to be re-filled from time to time with mortar and such work is not only costly in itself but expensive in its results, as the workmen engaged in doing it must necessarily break and damage a great part of the tiles they tread upon. Messrs Martin et Du Welz's tiles do not call for any repair or re-jointing and the advantage of this is obvious.

The considerations we have indulged in might suffice to prove that nowhere can good bricks and tiles be procured at a lower price than from the "St-Mary Tile Kiln." Yet we may add that there is another circumstance which enables Messrs Maertens et Du Welz to produce their goods at a cheaper rate than any which appear on the market and this is that brickmakers' wages are lower in Belgium that in almost any other country on the Continent, while the raw mate-

rial being found in abundance is also very much less expensive.

Now, our readers will naturally conclude that with such feathers in its cap, the " St-Mary Tile Kiln " is gradually defeating every kind of competition, home or foreign. The conclusion is a correct one. In a great many instances, the firm are so overflooded with demands that it is difficult for them to meet all. Nevertheless, orders are promply complied with, thanks to the powerful organisation of the workmen and managers. Messrs Maertens et Du Welz supply the whole continent and colonies and it is only through lack of time they have hitherto been prevented from forming a connection in Australia. In this respect, the Sydney Exhibition where they exhibit samples of their manufactures will do for them what they have themselves failed to do, so that we will soon see their bricks and tiles appear on many roofs and house facings in the streets of New South Wales, Queensland, Victoria and other parts of Australia Their introduction into the English Australian colonies will improve the appearance of thoroughfares, save the houseowners' money, and spare the lodgers' health and quietness by preventing the transmission of dampth or noise.

In reference to stone, a firm which appear to us quite justified in seeking a new commercial outlet in Australia is the Société industrielle du Grand Duché de Luxembourg (a joint stock Company) whose seat is at N° 20, chaussée d'Haecht, in Brussels,

The Société industrielle du Grand Duché de Luxembourg have sent out, to the Sydney Exhibition, samples of grindstones of different sizes for tool grinding, all of which are made of excellent tough stone extracted from the rich quarries which the Company have at their command in the valley of the Sure.

As the firm manufacture grindstones on an exceptionnally and we may say, without fearing contradiction, on an unprecedented scale, it is impossible

for any other establishment in Europe to compete with them either in point of cheapness or make, and the advantage at which they produce their manufactures is very clearly illustrated by the fact that they are the sole contractors to the Belgian Government's workshops and repair stores, as well as to all cutlers and large firms in Belgium and else where.

CHAPTER THE FIFTH

Chemical Produce.

The manufacturing of chemical produce is fast becoming an important feature of belgian industry. For a long period, continental trade had looked almost solely to England and France for supplies of the kind; but the extraordinary growth of the glass and woollen industries in Belgium, after the overthrow of Dutch rule in 1839, suddenly altered this state of things and brought a third and serious competitor into the market.

Woolwashers and glassmakers without speaking of metal founders, paper manufacturers, etc. were ready-found customers for any one who undertook manufacturing chemical produce and it will therefore be easily conceived that many and many were the practical men who grasped at the opportunity of cultivating such a promising branch of trade. In course of time there hardly was a district in Belgium without a chemical product factory and it was not long before our manufacturers even began to compete with foreign produce abroad.

At first, this only came about slowly but of late years the influx of belgian chemical articles into foreign lands has been increasing in such a measure as to amaze and alarm other producing countries. In support of this, we may furnish our readers with a few figures.

In 1866, the amount of Belgian carbonate, nitrate, sulphate of soda alone exported abroad was no more

than 1025 tonweight, worth 7495 pounds sterling, while in 1876, it exceeded 7085 tons worth 58,347 pounds sterling.

In 1866 the amount of other properly-called chemical produce exported only reached 81,251 l. st., while between that time and 1876 it rose to the figure of 259,728 l. st. And probably, in the very deductions which may be drawn from these figures, lay the secret of the ever increasing demand for Belgian chemical produce on foreign markets.

It will be seen that the 7085 tons of carbonate, nitrate, sulphate and sulphite of soda exported in 1876 being worth 58,347 l., must be sold on the whole at 8 l. 4 sh. and 8 d. per ton, whereas similar foreign produce imported to Belgium (1) during the same year, were quoted by the producers at 8 l. 19 sh. 3 d., that is to say about 10 per cent dearer than our own.

The difference of rates we have just pointed out probably arises from the fact that Belgian workmen are more skilful and careful than others, while their salaries are lower.

What we have said of nitrate, carbonate, sulphate and sulphite of soda may be said of all the other chemical produce manufactured in the country, including sulphur, ammonia soda, sulphuric acides, etc., so that to complete our information on the subject, we need not go beyond mentionning a few of the most important firms who cultivate a branch of trade so likely to find good custom in Australia.

Foremost among belgian manufacturers of chemical produce stand Messrs SOLVAY & Co. whose process for manufacturing ammonia soda has been the means of securing for them wide world renown.

Theoretically, the chemical reaction by means of which only ammonia soda can be produced appeared

(1) Of course there is no import duty in Belgium on foreign chemical produce or we should not have made such a calculation.

easy enough to obtain long before Messrs Solvay & Co. had taken the subject in hand.

As early as 1838 and in the ensuing years, eminent chemists took out patents and endeavored to produce ammonia soda on the reaction principle, but owing to the imperfection of the apparatuses employed, all the attempts made to put theory into practice failed in turn, so that the problem of manufacturing ammonia soda had come to what appeared a hopeless standstill when, in 1873, during the Vienna Exhibition, the scientific press announced, as a most important event, that it had been definitively solved by a laboriously-devised invention of Mr Ernest Solvay, one of the heads of the firm of Solvay & Co. The Vienna International jury corroborated this intelligence by presenting the inventor with the Diploma of Honour and this distinction has since been confirmed bz the juries of the Philadelphia Sechshau's and Paris international Exhibitions (1876, 1877 and 1878) who successively conferred upon Messrs Solvay & Co. the highest award obtainable.

This, however, is nothing when compared to the practical success of the invention. So great has been the demand for Messrs Solvay & Co.'s soda, since it has appeared on the market, that the annual production of it has already reached the enormous figure of 45,000 ton weight which will shortly be brought up to over 60,000. Four vast factories are at work in manufacturing it : One at Coullet, in Belgium ; another at Varangéville-Dombasle, in France ; and two, again, in England.

Enormous quantities of Messrs Solvay & Co.'s ammonia soda are employed in Belgium, Great-Britain, France, Germany, Russia, North and South America, for goblet-making and moulded-glass manufacturing, its qualities, as regards purity, density, high test and cheapness being such as to render it invaluable as an agent for producing sound and cristal-like glass at a lower price than when any other soda is employed.

In other countries — in fact, all over the world —

it is now used either for manufacturing ultramarine blue and soda crystals or as a substitute for soda crystals in dyeing, scouring, bleaching, borax-manufacturing. paper sizing, etc., in others, again, as a substitute for caustic sodas, in soap-making, paper mills, paper pulp manufacturing, etc.

It also enters largely into the manufacturing of pyrolignitie produce, pure acetates, starch, picrate, sulphite, borax, silicate of soda, candles, etc., it is used in oil refineries, metal mills and wireworks, in sugar factories for revivifying animal charcoal, in glucose factories, in fact, in every shape it can assume and in almost every land throughout the world.

But woolwashing is undoubtedly one of the numberless purposes which it is calculated to answer in that greatest of wool- producing countries — Australia. The properties of Messrs SOLVAY ET Co's soda, as pointed out above, render it, indeed, peculiarly commendable for woolwashing, as it in no way interferes with the suppleness of the fibres, whereas ordinary sodas, invariably containing a certain portion of caustic soda, must necessarily render any wool treated through their medium, both stiff and brittle and therefore most unsatisfactory. The absence of iron which constitutes one of the characteristics of Messrs SOLVAY ET Co's soda is also a most precious and desirable quality in woolwashing.

The following analysis of the firm's produce, showing its richness in soda and how far it is free from iron ingredients, and causticity is, after all the best explanation we can offer for the extraordinary success it has obtained throughout the globe :

Water	0,147
Silica and carbon	0,053
Chloride of sodium	0,064
Sesquioxide of iron	0,003
Alumina	0,009
Carbonate of lime	0,071
Carbonate of magnesia	0,021
Carbonate of soda	99,632
	100,000

It will thus be easy for Australian manufacturers to satisfy themselves as to the properties of Messrs Solvay et Co's ammonia soda and the unlimited scope it lays open for manufacturing purposes.

We may single out an example of this : One of the special advantages of Messrs Solvay et Co's process is that, by means of it, vast quantities of chloride of calcium are produced. Mr Solvay has succeeded in using this chloride of calcium, in the most ingenious manner, for producing hydrochloric acid. Now it is easy to perceive what services this discovery is calculated to render in Australia, when it is remembered that acids are so expensive and so inconvenient to transport as to render their importation into foreign countries an almost impracticable thing, whereas chloride of calcium is easily and cheaply conveyed to any imaginable part of the world.

When once supplied with Messrs Solvay's chloride of calcium, Australia might turn it to extraordinary account by using it for manufacturing native hydrochloric acid which, being obtained at exceedingly low rates, would offer the population an opportunity of cultivating a number of branches of industry hitherto neglected and give a wonderful impulse to enterprise and growth of private and public wealth throughout the Australian Continent.

Next to Messrs Solvay, worthy of notice also are Messrs David et Co, manufacturers of chemical produce at Moustier-sur-Sambre, near Namur, who carried the highest prize, *viz.* the gold medal, at the late Paris Exhibition (1878) for their several kinds of articles consisting chiefly of soda, bicarbonate of soda, hyposulphite of soda, sulphuret of potassium-in fact, of all chemical products based on soda and sulphuric acid.

Messrs David et Co's factory principally turn out such manufactures as are employed for preserving fresh skins as well as for unhairing and tanning same. The firm undertake chemical fabrication, even for

third parties, besides transacting their wholesale import and export business through the channel of commission agents.

The most important sulphur refinery in Belgium is that of Messrs Koch et Reis established at Antwerp and known as the *Raffinerie du Nord.*

Thanks to the entirely new process they work upon, Messrs Koch et Reis are able to turn out an absolutely pure article, at comparatively low rates.

The superiority of the firm's produce was officially recognised at last year's International Exibition in Paris, the gold prize medal the only testimonial of the kind awarded in the sulphur departement-being conferred upon Messrs Koch et Reis whose exhibits, and particularly their extra-fine flower of sulphur were acknowledged to be more perfect, in point of purity and fineness, than any manufacture hitherto known.

Messrs Koch et Reis' refined sulphur is delivered to trade in the shape of roll, rock and block brimstone ; of sublimed flowers of sulphur, both of standard and highest quality, and is forwarded in every shape of packing required.

The firm's trade mark, viz. R & K with a (crowned Lion in the centre), enjoys great repute all over Europe and especially on the English and Indian markets.

The only manufacturers of ultramarine in Belgium are Messrs Gustave Bottelberge et Cie, of Melle-lez-Gand, whose blue, green, violet and red ultramarine are most highly appreciated and employed all over the world for the color trade, for paper making, paper staining and calico printing, for thread and stuff bleaching-in fact, for all purposes which ultramarine blue is intended to fill.

Messrs Gve Bottelberge et Co's factory which was

started in 1843, produces 730,000 French kilogs (about 820 English ton) of goods per year.

The firm have obtained fifteen of the highest prizes at International Exhibitions and the latest among these is the gold medal, awarded to them last year (1878] for their contribution to the great Exibition in Paris.

Another firm with which Australian importers will be able to transact most profitable business is that of Mess^{rs} Byl fils et Cie, manufacturers of phosphoric matches and blacking at Grammont, in the Western Flanders.

Mess^{rs} Byl fils et Co's phosphoric parafine or safety matches are made of the purest materials, as is shown by the fact that none of them ever misses.

After the late Franco-German war, the Fench Government took away their licenses from all the lucifer makers in France and taxed matches heavily. The consequence was that their price rose very much, while the Government having the trade all to itself, began to manufacture such bad matches as justly excited general complainfs. Ever since that times Mess^{rs} Byl fils et Co's manufactures have been employed all over the Continent, giving every one the utmost satisaction. Samples of these wil be found at the Sydney Exibition together with the firm's blacking which, constitutes a brillant polish and is known to preserve boot leather instead of imparing it, as most blackings are wont to.

We may now mention Doctor Quirin Haanen's Exquisite double distilled "Eau de Cologne" which, on account of its delicate perfume, has become the great favorite of the public (*trade mark below*). Its hygienic qualities are, at the same time numerous. The large quantity of ozone it distills, when in contact with the air, renders it most useful in invalids 'bedrooms for

destroying infectious germs and such obnoxious gases as create disease and produce decay. When tempered by the perfume of Doctor Haanen's water, such obnoxious gases are harmless, even through they be inhaled by the patient.

Another of the perfume's properties is that it regulates the ciaculation of the blood in the finest vessels and affects the most sensitive nerves in such a manner as to relieve one from nervous pains of every description.

Nothing can be more soothing to the skin when used for washing purposes. In such cases it may be diluted in water, mixed with flour or sprinkled over almond or glycerine soap than which nothing can be finer, when so used.

Combined with fine chalk it replaces with advantage the most renowned of teeth-cleansing compounds and its action on hair is equally efficient, when applied with an admixture of oil or grease containing soda.

While keeping the breath free from smell, it protects the teeth from decay and admirably preserves the whiteness of the enamel. In fact, it is the simplest and most agreeable substitute for a costly medicine chest containing various remedies against infection or decay of the mouth, of the teeth, of the skin and of the hair and its effect on nervousness is not the least remarkable of its properties.

During the Sydney Exhibition orders for Doctor Haanen's "Eau de Cologne" should be addressed to Mr Prosper Lamal, in the Exhibition building, and after the Exhibition to M. E. Haanen, at Cologne, Germany or at Verviers, Belgium.

CHAPTER THE SIXTH

Tissues

We now come to what is, with metallurgy, the leading branch of industry in Belgium. Indeed we may say that spinning and weaving is a national occupation. Thanks to the immense coal mines situated in the part of the country known as the "Borinage" and in the province of Liège, thanks to the number of Belgian factories where machinery used in spinning and weaving mills are constructed, and to the experience and activity of our working population, we may say that we not only equal but surpass the most cultivated nations, as regards thread, linen and cloth manufacturing. These branches of industry are among the first that were practised in Belgium. As early as the 12 th century, our flemish towns already produced quantities of linen and cloth fabrics.

At Verviers-which is the chief cloth producing centre in Belgium and in the world-the population took to such pursuits as early as 1170 and in 1432 foreign merchants came in such large numbers to purchase the Verviers produce, that an enormous cloth market had to be built for the express purpose of facilitating transactions.

Ever since that time the spinning and weaving industries have been growing in power and extent. The manufacturing processes are handed down from father to son and there is not an improvement devised either in Belgium or in foreign countries before all our manufacturers immediately apply it.

The raw materials we employ are flax, hemp, jute, cotton wool and silk, and the transactions they give rise to present a figure of 2,400,000 l. st.

In 1876 our exports in flax yarn amounted to 9506 tonweight worth 1,807,278 l. st., while our imports only attained the figure of 2658 tonweight worth 447,093 l. st. In coton yarn, our exports amounted to

1686 ton worth 250,465 l. st. while our imports were only 717 ton worth 158,092 l. st.

We have at present in motion over 300,000 spindles and nearly the whole amount of our production is purchased by Great Britain and France.

Jute and hemp play a much smaller part, only setting together in motion about 25,000 spindles, but we have 800,000 cotton spindles mostly producing high-numbered threads and yarns which are used in Belgium, the Netherlands, Switzerland, France and Italy.

We need hardly speak of our worsted. The mere fact that Verviers alone exports 33,111 bales of it representing a net weight of 558 ton of material ready for spinning, speaks loudly enough for itself.

Foreign spinners come and purchase our machinery and carding-engines; they buy our wool from our washing mills and bribe our head workmen away and yet they cannot succeed in producing or even imitating our woollen fabrics.

Most of our linen fabrics are weaved by hand. This enables our manufacturers to turn ont beautiful work, at a very low rate, the rural population working at exceedingly moderate salaries. Our linen fabrics are generally lighter than French and stronger than Irish. Our table cloth linen is of the richest description with regard to glossiness and designs, and on the other hand there is not a country from the Gulf of Mexico to the Straits of Magellan that does not apply to us for our union linens, a single of our manufacturing towns owning no fewer than 5000 looms.

Ghent is the head quarter of our cotton fabric manufacturers who employ, in that city alone, more than 1,400 looms. Our exports in linen fabrics amounted in 1876 to 695,579 l. st. representing over 2527 ton-weight and our imports only amounted to 37,807 l. st. while our exports in cotton fabrics were 3180 ton, worth 638,334 l. st. and our imports were 1482 ton, worth 500,522 l. st. These figures also show the difference in price between Belgian and foreign produce.

As to our cloth manufactures, their superiority is

every where acknowledged. With regard to colors and light shades, for instance, our producers have stood unri valled, ever since the Belgian engineer Bidault endowed the town of Verviers with the *barrage de la Gileppe* a tremendous waterwork or cataract which supplies our manufacturers with 71 million cubic feet of pure water for woolwashing aud other processes connected with cloth manufacturing. It is principally owing to the *barrage de la Gileppe* that the dyeing process is so perfect in Belgium and that our producers occupy such a prominent position. During 1877, the town of Verviers alone employed 92,625 bales of wool weighing 36,043 ton. The Verviers manufactures turn out annually about 400,000 pieces of cloth, and, besides supplying the whole of Belgium, export their goods to the amount of a million and a half sterling.

The *Société de la Lys*, at Ghent, spins every kind of flax and oakum yarn from n° 10 up to n° 200 and its produces overrule even the English.

The *Société linière gantoise*, seated in the same town as its name indicates manufactures n^{os} 10 to 200 and bleeches its own produce remarkably well.

The Société anonyme de St-Léonard, of Liège, manufactures threads for handkerchiefs and also for weaving the linen fabrics which Belgium and Ireland are almost alone to produce.

With regard to linen sewing threads we find, amongst the leading Belgian manufacturers of this branch Mess^{rs} Druwé et Henderichex, of Alost, whose yarn is remarkably even and strong.

The firm dye their own manufactures and deliver them in skeins, bobbins or balls and also produce special threads for tailors, bookbinders, lace-makers, etc samples of which will be found at the Sydney Exhibition.

In the cotton trade, Messrs C. De Wos et E. De Wert's cotton mills situated at nº 55 quai de l'Industrie, in the city of Ghent are noted as one of the chief establissements in Belgium.

Their principal produce is high numbered indian cotton but they also manufacture large quantities of weft-cotton and warps either in bobbins or in skeins from number 4 up to number 20.

The finest quality of raw material is applied to every one of these manufactures which are pronounced remarkable, by all wo employ them, for their evenness and solidity. It is therefore almost needless to add thal Messrs C. De Wos et De Wert have a large connection in France, Switzerland and abroad generally. Although competing with the largest English and foreign manufacturers they were awarded the prize medal at the last Paris Exhibition (1878) a fact that speaks more loudly on behalf of their merits than any thing we could ourselves possibly say.

In the same line we must also mention the produce of Messrs Camille de Bast et Co who, besides manufacturing nos 8 and so on up to nº 36 (English numbers), also turn out wicks for candles and wax matches and thrown cotton.

Messrs C. de Bast et Co's factory is a very large one, and although unforeseen circumstances have prevented the firm from contributing to the Sydney Exhibition there is no doubt but that their manufactures will be much sought after in Australia, when we have stated that they are in great demand on the continent and elsewhere on account of their substance, careful finish and comparative cheapness.

We now come to manufactured cotton fabrics.

One of the leading Belgian manufacturers in this branch is Mr J. Suppes, of Ghent, who started his factory in 1850, especially for export trade. The firm's

cotton, flax, and plain or fancy thread and cotton fabrics are particularly commendable, but beyond all, stands its union linen which is so beautifully worked as to be easily mistaken for full thread linen, the only difference being that it is stronger and cheaper by half. In tropical countries, where full thread linen is unbearable, shirts in union linen are now in general use, not only because they are suited for the climate, but again because they are as pleasant to wear as linen, while not exceeding the cost of cotton. M. Suppes' union linen towels are likewise in great demand, on account of their wearing qualities and pretty designs and above all because of their cheapness. The same firm export large quantities of printed tick and jute packing cloth.

To mention all the cloth manufacturing firms would be a tedious task. We will therefore select a few of the most remarkable and mention them in alphabetical order.

Mess^{rs} Biolley Frères' light colored wollen stuffs are patterns of good taste and careful finish and can compare with the best of Elbœuf cloths. The firm's seat is at Verviers. Thay have contributed to the Sydney Exhibition

Mesr^{rs} L. et J. Garot, of l'Ile Adam (Verviers) manufacture both carded and combed woollen fabrics principally for gentlemen's clothing but also for ladies. The best thing we can say of Mess^{rs} L. et J. Garot's articles is that they carried the bronze medal at the Dublin Exhibition (1865), the silver medal at the Paris Exhibition (1865) the silver medal at the Paris Exhibition (1867) the medal of merit at the Vienna Exhibition (1876) and the gold prize medal at last year's (1878) Paris Exhibition. The firm have also exhibited samples of their produce at Sydney.

Messrs J. J. Olivier et fils excell in manufacturing woollen cloths for carriages, furniture and military equipment. They supply several large armies and fit most of the great Railway Companies' carriages Specimens of their ware will be found in the collective show made at Sydney by the Verviers cloth producers.

Messrs Peltzer et fils, of Verviers, deserve to be specially mentioned. It was a member of their house, M. Henri Peltzer, who first introduced into Belgium some of the improved machinery invented in England for the several processes connected with woollen cloth-making, and the advantage which this gave the firm over their competitors is one which they have never relinquished since.

Messrs Peltzer et fils' establishment is considered as an exceptionally large one, even in that greatest of cloth-manufacturing centres-Verviers.

The firm manufacture woollen cloths and stuffs of all kinds and colors (moskowas spanish stripes, satin cloths, etc...) both for gentlemen and ladies' wearing apparel; they also make bay yarn and in fact they are about the only firm whose production embraces all manufactures wool is intended for.

Messrs Peltzer et fils turn out no fewer than 20,000 pieces of cloth (about 425,000 yards) *per annum* and employ over 1,500 hands.

They work two different spinning mills, one for carded and the other for combed wollen fabrics and purchase their raw material direct from the places that produce it.

Messrs Hte Rolin fils and Co, of St Nicolas (Waes) specially manufacture fine tartan shawls, of the latest ashion, in all sizes, as well as heavy shawls known as draped shawls. They also produce fancy clothing both in carded and combed wool, tweens, diagonals, levantine, plaited and sabled.

The firm's factories being situated in an essentially agricultural district amidst a population which is remarkably fit for weaving and whose wants are so limited that they can work at lower rates than other laborers, MESSRS ROLIN FILS ET CIE'S general expenditure is less than that of other establishments, so that they are able to compete with all manufacturers of their branch, whether home or foreign.

Independently of this, their firm determination to produce nothing but best quality articles has secured for them an ever growing reputation which an inspection of their exhibits at Sydney will show to be perfectly justified.

M. A. J. SAUVAGE'S mill at Francomont (a suburb of Verviers) is one of the oldest in the district. It was started in 1760 and enjoys much credit at home and abroad for its produce comprising combed and carded woollen fabrics, besides carded bay yarn.

The awards the firm have obtained at the only Exhibitions to which they have hitherto contributed (Paris 1855, London 1862 and Paris 1878) are evidences to the manufacturing progress accomplished by M. A. J. SAUVAGE'S house since its foundation.

What makes the firm's stuffs particularly noticeable is the great variety and good taste of the patterns, the freshness and substance of the shades, the suppleness of the textile matter — in short, all the characteristies of good, strong, and elegant material. M. SAUVAGE manufactures fancy stuffs for jackets and complete suits of clothes either plain or mixed with combed and carded wool, while his light-colored articles which are imported into most ultramarine countries and warm climates have been the means of carrying his industrial repute far beyond the seas The firm also work a carded bay yarn spinning mill the manufactures of which are remarkable in point of variety and mixtures. Their annual production, including woollen fabrics and bay yarn, amounts to about 100,000 l. st.,

their business outlets extending over the whole of Europe, the East and ultramarine countries.

At last year's International Exhibition in Paris, the jury granted M. SAUVAGE the gold medal and the Belgian Government expressed their pleasure at such a deserved success by conferring the knightood of the order of Leopold, upon M. LÉON SAUVAGE, the senior member of the firm.

Without going much out of our way, we may state that one of the Belgian firms that will render most service to Australian industry is undoubtedly that of M. J. VAN DROOGHENBROECK, of Ninove, whose linen gear or heald yarn, six and eight fold twist, plays such an important part in cloth-manufacturing. That Australia supplies cloth-manufacturers in Europe and in America with the greatest part of the wool they employ is a secret for no one. It would be a subject of much wonder that a country like Australia should neglect to avail itself some day of the wealth it might reap by using its raw material for the production of manufactured articles.

In fact, technical knowledge has made such progress in New South Wales that the manufacturing processes are already commonly known there, as is shown by the fact that woollen cloth mills are being set up all over the country; and at the rate things are proceeding, it is easy to foresee the day when, thanks to the abundance and cheapness of its wool supplies, Australia will defeat French, English and American competition and become, with Belgium, the most important cloth-manufacturing country in the world. Fortunately what Belgian industry might possibly lose through Australia's competition, it is certain, in some measure, to recover in another direction. It is to Belgium, for instance, that the Australian cloth-manufacturers will have to look to for the extra-linen gear or heald yarn used in weaving for connecting the healds or shafts of the loom through the medium of which the alternate

movements of the threads of the warp are effected. For, Belgium can boast of possessing the leading gear on heald yarn factory in Europe *i. e.* that of M. J. Van Drooghenbroeck, whose name we mentioned above.

M. J. Van Drooghenbroeck who occupies as a manufacturer of linen gear or healdyarn, the position which Brooks occupies in England as a sewing thread producer, enjoys a kind of European monopoly which England itself cannot possibly dispute. English houses manufacture their healds with spun cotton. M. Van Drooghenbroeck's yarn is in linen and therefore very much superior to the former, as it is more even, stronger and at the same time cheaper.

It may therefore be safely assumed that as the practice of cloth-manufacturing extends, the Australian producers will apply to M. J. Van Drooghenbroeck's factory at Ninove for an article of which it would be materially impossible for them to find an equivalent in the mother-country.

We may as well say a few words now of the Manufacture générale de caoutchouc (The General India Rubber Factory) established in 1852 at Molenbeek-St-Jean (Brussels) by Messrs. Eugène Pavoux et Cie. So numerous, indeed, are the manufacturing purposes to which the firm apply their india rubber that it would be difficult to select a special chapter of our work to mention them in, as they embrace almost every branch of industry imaginable.

In the first place, Messrs Pavoux et Cie use their india rubber as a fire and waterproof clothing material for general walking dress, miners', firemen's and divers' costumes, etc. Next, come their india rubber valves, suction and delivery pipes of every size and remarkable for their elasticity and finish; then again, their pipes for fire engines which may be worked either by hand or by steam and made so tight, so easy to handle and so low in price, as compared with leathern pipes, that

they have been adopted by captain Shaw for the most perfectly-stocked corps in the world, *i e.* the London Metropolitan Fire Brigade.

Mess^rs^ Pavoux' air cushions and mattresses, belts for wheels and endless straps for putting general machinery into movement, their balloons and window pads, their surgical ware and india rubber fabrics for shoemaking are further but a few out of the endless list of articles they contrive to produce with a substance which was long considered as being of very limited practical use. We cannot however end this abridged list without mentioning the firm's gas pipes, manufactured by means of a machine of their own invention, and more strongly made still than solid metal pipes.

Their fancy articles, such as hardened india rubber tables, whose aspect imitates that of marble to perfection, game boards, billiard bands, etc., also do the greatest credit to Mess^rs^ Pavoux et C^ie^ who, it will now be easily conceived, have carried the highest rewards at every great International Exhibition held since 1865 and export their goods to England, Germany, France, Switzerland, Italy, Spain, Asia, America and in fact all over the world.

As we do not intend devoting a special part of our work to leathern fabrics this is the best place for mentionning the principal firm in this branch that have taken part in the Sydney Exhibition. We allude to M. Sironval Paris, a tanner whose establishment is situated at Verviers. Besides the boots and shoes wich M. Sironval Paris has sent to Sydney, the firm also manufacture leather straps and leather for making straps, out of the best of raw material that can be had.

Before closing this chapter, we may mention another branch of industry which, although unrepresented at

the Sydney Exhibition, is nevertheless making rapid progress in Belgium. We allude to embroidering by machinery on bobbin-net, a process introduced in the Belgian kingdom by M. J. H. G. CHRISTIAENSEN of Antwerp.

At first sight one might think that embroidery manufactured by machinery must be very much coarser than work done by hand. Such, however, is far from being the case. At last year's International Exhibition in Paris, M. Christiaensen purposely exhibited, side by side, both kinds of work and not only was it found that embroidery obtained by mechanical processes could thoroughly compete with home-made embroidery, while being very much cheaper, but, moreover, that the former was fine and delicate enough to strike even the most practised eye, as being lace. M. CHRISTIAENSEN was accordingly awarded the prize medal by the jury, while the Belgian Government awarded the knightood of the Order of Leopold te himself and a decoration to one of his head workmen. In this country, M. Christiaensen's embroidery is already very much worn by ladies of taste, and there is exery reason to believe that it will come into fashion in Australia, after this book has been casefully perused.

CHAPTER THE SEVENTH

MUSICAL INSTRUMENTS.

A country, like Belgium, which is the land of Adolphe Sax, the inventor of the *saxophone,* the birth place of Lichtenthal and of many other notorious musical men, cannot possibly be behind hand as regards musical instrument-making. There are but a very few places on the Continent where the instrument industry is practised on a large case and on really sound principles, and Belgium is one of these. We will not at

present enter into technical details concerning the various qualities of our articles; the remarks that we respectively apply hereafter to each of our principal manufacturers wile enlighten our readers as to the general features of our produce.

We may safely assert that nowhere are musical instruments manufactured on such a large scale and to greater perfection than by M. C. MAHILLON, of Brussels, manufacturer of brass, wood and percussion instruments to the Belgian, English, Spanish, Dutch and Russian armies and to the Royal musical academies of our country. There is hardly an army, an orchestra, a band or a school of music in Europe without M. Mahillon's instruments.

In order to attain results of mathematical precision, M. MAHILLON applies the most improved tools to the making of his instruments which, in spite of the expense they entail upon him, he hardly sells at a higher figure tham the common, cheap and improperly called " export instruments " are sold at.

From 1836, the date of their foundation, downwards, the firm have obtained the highest rewards at all Exhibitions held either in Belgium, England or North and South America, including the late Paris Exhibition when they were honored with the gold medal. Samples of Mr Mahillon's bassoons, clarionets, cornets, bugles, trombones, euphonia, horns, trumpets in every key and in every kind of material will be found at the Sydney Exhibition and in fact all over Australia where Mr MAHILLON has already a large connection.

It is right that we should begin our account of Belgian piano manufactories by mentioning the oldest and most important among them-namely that of MESSRS F. BERDEN ET CO, of Brussels.

Although the firm is known throughout the globe, it

Messrs Campo nephews' (late Berden & Co's) Piano Factory

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may be well to give a brief sketch of the circonstances to which it owes its reputation. — Messrs Berden et Cie's present establishment was started as early as 1827 by Messrs Lichtenthal et Cie who soon attracted the attention of the musical world by their square cross-chorded pianos-an invention for which Steinway, the American manufacturer, has sometimes received undue credit (1) A little later, the firm applied their cross-chord system to their cottages ; since then, thy have never ceased to assert their superiority over their competitors, and the reason is obvious. With the exception of Messrs Erard and Pleyel, they are almost the only manufacturers in Europe who construct the mechanical parts of their instruments, including the key boards, themselves, so that, whereas other firms have to accept and apply the mechanical principles generally laid down Messrs Berden et Cie can combine in their instruments every advantage offered by foreign systems with every improvement of their own.

As an instance, we may state that while retaining Erard's double escapement, they do away with every other feature of Erard's and Herz's systems and effect, in their stead, such desirable changes as enable the internal organs of their pianos to transmit the action of the pianist without its being diminished or weakened in transmission, besides making the mechanical strength proportionate to the vibrating powers of the sound board-a *desideratum* which is often lost sight of even by the most eminent makers.

Every one of the firm's pianos (grand oblique or cottages) are manufactured in the same scientifical spirit-so much so, in fact, that genuine artists and lovers of music acknowledge them to be unparalleled as regards

(1) Mr Lichtenthral's square cross chorded pianos were patented in-1834. Mr Steinvay was then quite a youth living in Hannover, his birth place, under the name of « Stainweg » which he turned into « Steinway » to give it an English appearance when he settled down in America.

elasticity, ampleness and mellownes of touch, evenness of sound and power of vibration.

Although the firm has twice changed its name-it came into the hands of Messrs F. Berden et Cie, in 1845, and is now carried on by the nephews, Messrs Campo frères-never has the manager's spirit of entreprise and progress abated in the least. On the contrary, the sucess of the Berden instruments has gone on increasing in such a degree that the firm have been compelled to extend their premises several times and the foregoing engraving of their present establishment will give our readers an idea of the magnitude it has reached.

To mention all the awards the firm have carried since the foundation of their house down to the present time would take up more space than we can dispose of, but the fact that the prize medals were conferred upon them at the London Exhibitions in 1851 and 1862 and similar distinctions at the Paris Exhibitions in 1867 and as late as 1878, will, suffice to show that far from losing ground, they have been progressing from year to year in public estimation.

One of their later ideas has been to impart to their instruments such properties, in point of build, as might fit them for long journeys and for export to distant lands, and in this they have been so successful that no pianos can better resist the roughings of a long journey and the amotspherical influences of warm of damp climes.

There is so little doubt, about it that Messrs Campo nephews have now a wide connection in such remote parts as Malaisia, Brazils, Canada, Asiatic Turkey, South Africa, etc., and that the ever-increasing number of demands has compelled them to appoints agents in the following parts.

Java Batavia. . . .	Messrs [redacted]
« «	Van Vloeten et Cox.
» Samarang. . .	Storck.
» » . . .	Hözel.
» Soerabaya. . .	Herzberg.
Rio-Janeiro. . . .	Narcizo et Arthur Napoleão.

Brazils	Pedro Klaes.
Canada-Québec . .	Arth. Lavigne.
Smyrna	Moxhet et Alberti, consul de Suède.
Port Natal	Walter Peace, consul de Belgique.
Natal South Africa .	P. Davis, Jun.
Maritzburg et Durban.	Davis et Sons.

The firm have sent samples of their instruments to the Sidney Exhibition where similar success awaits them.

In view of this and of the forth-coming International Exhibition in Melbourne, the firm have sent out to Australia one of their partners, M[r] Otto Campo, who will supply private persons as well as trade with further particulars, on application to the Belgian consulates at Sydney and Melbourne.

The firm construct special pianos for the several colonies of Australia, New Zealand and Tasmania The price of these pianos varies according to quality but is, in any case, very low as compared to the musical merits of the instruments-which, as we have already stated, cannot be too highly spoken of.

Among Belgium's great piano factories also stands that of M. J. Oor, of Brussels, which although newly, started, already competes successfully with the leading European firms.

After carefully trying M. Oor's instruments, any one would believe them to have been issued by one of the great French, English or American houses whose reputation is as old as their name. Such indeed was the opinion of the jury at last year's Paris Exhibition for they gratified the Oor pianos with a prize medal besides conferring special distinctions on three of the firm's experienced workmen.

This was the first time the firm took part in an International Exhibition.

Pewer of resonance, softness of tune, elasticity of touch and remarkable taste in the outward carving and ornamentation-all these properties which constitute a good and fine piano can be claimed for M. Oor's

instruments. The firm's pianos have also another quality which must render them very valuable in Australia : They are especially constructed in view of being imported into warm or damp regions where instruments cannot resist the action of climate, unless the mechanical parts, as well as the case, be made of special metal, wood and other material more substantial than what is employed for pianos remaining in mild temperature.

Out of Brussels, one of the best of Belgian piano factories is that of M. B. Van Hyfte, established at Ghent in 1835 and whose instrumental inventions are patented.

The firm's cross chorded upright pianos of large or average size with iron framing and bars (*cadre en fer*) and their vertical chorded pianos, built entirely of iron are particularly appreciated abroad, as they are very solidly constructed and impermeable to any degree of dampth or heat in foreign climates

M. Van Hyfte also exports a large number of his vertical and oblique-chorded pianos which are much liked for their softness of touch, power of tone, strong build and careful finish. Another point in their favor, is their comparatively low price.

Besides this, Belgium being in direct communication with the whole world the transport rates are excessively moderate. This enables M. Van Hyfte to forward his instruments through the medium of the best shipping agents in the country.

Among the Exhibitions where the firm's pianos have carried prizes, we may mention the Brussels Exhibition (1874) Ghent, first class medal (1877); Utrecht, Netherlands, gold cross (1876) and Paris 1878.

Another firm worthy of being mentionued is that of Mr A. Berrens of Antwerp, who has sent to the Sydney Exhibition four of his pianos (cottages) varying

in price from 600 to 1,500 francs — from 24 to 60 l. st. — according to the richness of the woodwook.

There is perhaps hardly any other firm that can produce good instruments at such an extraordinary low price. It must not be imagined, either, that cheapness has been attained at the expense of instrumental quatities. Professionals who try the firm's pianos at the Sydney Exhibition, will find them perfect, in every respect, and especially convenient for amateurs performing in high-ceilinged drawing rooms or halls. They are constructed on the Herz principle which is too well known to require description and, strange to say, some of the cheapest among them are the prettiest, the case being made of ebony or black wood, fitted with chandeliers, pedals, etc. in nickel-a metal which Belgium is almost alone to employ on a large scale and which wears as well as silver, while being easier to keep bright and in good order. Pianos in this style have come quite into fashion and Mr BERRENS is extending his connection every day. All further information concerning the firm's instruments wile be supplied by Mr John Ludwige who represents Mr Berrens at Sydney.

CHAPTER THE EIGTH

VICTUALS AND DRINK.

What Belgium produces in this line may be easily inferred from the figures we have given in our introduction concerning the area of cultivated land and its distribution. But as, on the other hand, dry pastes are the only kind of food, and spirits the only kind of drink that can be exported to such a distant country as Australia, we will only devote this brief chapter to two of the largest Belgian firms that are in a position to effect practical transactions with Sydney importers.

The most important of Belgian chocolate factories is that of Mr A. JOVENEAU, established at Tournai in

1840 and which, in course of time, has taken up a similar position to that respectively occupied by Epps' and Meunier's in England and France. Mr Joveneau's factory mainly turns out fine chocolate at the moderate price of from one to two shillings per *lb.* besides ground cocoa of excellent quality. The firm's products have been awarded the highest prizes at all International Exhibitions and, what is still better, they are in great demand in India, in the United States and the Brazils. We therefore feel convinced they will also be welcomed in Australia.

One the other hand, our most important producers of spirits are Messrs VANDEN BERGH AND C°, of Antwerp.

Messrs VANDEN BERGH ET C° produce brandy, gin, bitter and spirits-samples of which they have sent on show to the Belgian Department of the Sydney Exhibition. All of these figure under the well known trademark « *La Cloche* » (The Bell) which is so well-known as to have become almost a household name not only in Europe but especially in America and on all foreign markets where spirits give rise to lively transactions.

There is, indeed, a circumstance connected with this trade mark which we may, perhaps, do well to mention. At the time, Messrs VANDEN BERGH AND C°'s firm was started in Antwerp — and that is many years ago — Belgian brandies, spirits, etc., were so discredited abroad that our manufacturers's export trade only rested on an old stratagem which consisted in counterfeiting the best foreign trade marks and launching their produce on the market, as anything else but Belgian produce. As we stated in our introduction, the enterprise and abilities of the native population had been kept down, up to the Revolution of 1831, by foreign rulers and the distillery branch of public activity was one of those which we had been prevented from cultivating on sound principles, as long as we remained under the strangers' yoke.

The consequence was that, when Belgium recovered its freedom and independence, our first distillers lacked

experience and knoweedge of manufacturing process and began working on the principle vulgarly known as the « cheap and nasty » principle which they inherited from their late masters — the Dutch.

There was only one exception to the general rule and this was laid down by Messrs VANDEN BERGH AND C° who had travelled and made themselves acquainted with all the secrets connected with the the production of good and thoroughly pure fabrics. Messrs VANDEN BERGH AND C° determined to produce nothing but the best of brandy and other spirits; they employed the best of raw materials, purchased the finest crops of wheat, rye and other grain that enter into the composition of spirits and stopped at no expense, as regards machinery, careful workmanship, etc., to attain the object they had in view. After working a little time in this manner, they soon produced goods thal could undergo the test of the most experienced tasters in the world, and having arrived at such results they adopted a trade-mark of their own- that which we mentioned above.

Of course, they had at first to battle very hard against the popular prejudices which prevailed against Belgian produce, but, by degrees these prejudices wore away and the « Bell » soon became such a reputed trade-mark that, far from frightening purchasers away, it now constitutes the most powerful inducements in favor of the merchandize so labelled.

In spite of they being slightly higher in price than others, on account of their exceptional qualities, MESSRS VANDEN BERGH AND Co's articles are sought after everywhere and the prices at which they are quoted, as soon as they appear in the colonies and on foreign maakets, shows what value is set upon them abroad.

MESSRS VANDEN BERGH AND C°, already transact a good deal of business with Australia, where an inspection of their exhibits at Sydney will certainly increase then connection still further.

THE END.