CANADA

DEPARTMENT OF MINES

MINES BRANCH

HON. W. TEMPLEMAN, MINISTER; A. P. LOW, LL.D., DEPUTY MINISTER;
EUGENE HAANEL, PH.D., DIRECTOR.

THE

PRODUCTION OF CEMENT, LIME, CLAY PRODUCTS, STONE,

AND OTHER STRUCTURAL MATERIALS

IN

CANADA

During the Calendar Year

1909

BY

JOHN McLEISH, B.A.

Chief of the Division of Mineral Resources and Statistics

OTTAWA
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ADVANCE CHAPTER OF THE ANNUAL REPORT ON THE MINERAL PRODUCTION OF CANADA DURING THE CALENDAR YEAR 1909.

STRUCTURAL MATERIALS AND CLAY PRODUCTS.

The subjects included under this heading comprise, in the order treated: cement; clay products of various kinds, such as brick, sewerpipe and tile, pottery etc.; lime; sand-lime brick; sands and gravels; slate; and stone for building and other purposes, including granite, marble, limestone, sandstone, etc.

That the year 1909 was one of record activity in the building trades, is evidenced by the greatly increased production of all classes of structural materials; nor was the increase confined to any particular section of the country, but appears to have been general throughout all the provinces. The value of cement sales in 1909 shows an increase of 44 per cent over 1908; clay products show an increase of 43 per cent; lime, an increase of 58·8 per cent; and stone production also a very large increase. The total value of the sales of these several classes of products in 1909 was $16,533,349, as compared with a valuation in 1908 of $11,339,955; showing an apparent increase in production of $5,193,394, or 45·8 per cent. Part of this increase, however, may possibly be ascribed to a more complete collection of the statistics for 1909, a special effort having been made to increase the efficiency of the returns, particularly as regards the statistics of clay and stone production.

A summary of the production of structural materials and clay products during the past four years is shown below:—

	1906.	1907.	1908.	1909.
	$	$	$	$
Cement	3,170,859	3,781,371	3,709,954	5,345,802
Clay products	5,072,635	5,772,117	4,500,702	6,450,840
Lime	1,009,177	974,595	712,947	1,132,756
Sand-lime brick	.....	167,795	152,856	201,650
Sand and gravels (exports)	139,712	119,853	161,387	256,166
Slate	24,446	20,056	13,496	19,000
Stone	2,113,699	2,027,262	2,088,613	3,127,135
Total	11,530,528	12,863,049	11,339,955	16,533,349

The structural materials and clay products are a class for which it would be supposed, and not without reason, that Canada possessed practically unlimited supplies of the raw materials. It is, therefore, a matter of some regret, to still find large importations, particularly of clay and stone products.

With respect to cement it may be observed that nine years ago, or in 1901, 64 per cent of the cement consumed in Canada was imported. The growth of the cement industry, however, has been such, that in 1909 the imports of cement amounted to only 3 per cent of the total consumption, showing the undoubted value of our resources in cement materials and the ability of Canadian cement mills to supply the home demand.

With clay products the conditions are somewhat different. The value of the production in 1900 was estimated at $3,195,105, which had grown to $6,450,840 in 1909, an increase of about 102 per cent. During the same period the value of the imports of clay products increased from $1,228,405 in 1900 to $3,247,539 in 1909, or an increase of about 152 per cent. In other words, the imports in 1900 constituted about 28 per cent of the total consumption, but the proportion had increased in 1909 to over 33 per cent. Thus Canada's imports of clay goods have apparently during the past ten years been increasing at a more rapid rate than the home production. This situation is no doubt due in large measure to our failure, up to the present, to locate or discover commercially available clays suitable for the manufacture of the better grades of clay products, also, it is probably due in no small measure to a general lack of technical training in methods and processes of clay working.

Limestone is found in abundance in almost every province of the Dominion. Both the exports and imports of lime are comparatively small and the production is consequently limited only by demand for home consumption.

There is a considerable importation of stone both for building and decorative purposes, the annual imports during the past four years having averaged in value somewhat above half a million dollars. Questions of economic expediency, and the personal desires of builders, have no doubt much to do with this, since there can be no doubt of the existence in Canada, in practically limitless quantities, of all kinds of stone of the best quality for either building or decorative purposes.

The development of both the clay and stone industries will proceed much more rapidly as the country grows in population and wealth, and when our resources in these products become better known and understood.

CEMENT.

Natural rock cement was not made in Canada in 1909, nor were any of the natural rock plants in operation in 1908, though a small quantity was sold during that year from the previous year's manufacture.

This industry, at one time of considerable importance in the Province of Ontario, has gradually given way to the manufacture of Portland cement, the production of which has shown a steady and rapid growth since its inception in 1890 or thereabouts. There is now also one plant at Sydney, N.S., making cement from blast furnace slag, the statistics of production being included with those of Portland cement.

The total value of cement sales in 1909 exceeded five million dollars. Statistics of the total annual sales of natural rock and Portland cement since 1887 are shown in the table following :—

Annual Production of Cement.*

Calendar Year.	Natural Rock Cement.		Portland Cement.		Totals.	
	Bls.	Value.	Bls.	Value.	Bls.	Value.
		$		$		$
1887					69,843	81,909
1888					50,668	35,593
1889	90,474	69,790	Nil.	Nil.	90,474	69,790
1890	87,521	74,822	14,695	17,583	102,216	92,405
1891	90,846	103,479	2,633	5,082	93,479	108,561
1892	88,187	94,912	29,221	52,751	117,408	147,663
1893	126,673	130,167	31,924	63,848	158,597	194,015
1894	72,965	74,842	35,177	69,795	108,142	144,637
1895	66,219	60,795	62,075	112,880	128,294	173,675
1896	70,705	60,500	78,385	141,151	149,090	201,651
1897	85,450	65,893	119,763	209,380	205,213	275,273
1898	87,125	73,412	163,084	324,168	250,209	397,580
1899	147,387	119,308	2 5,366	513,983	396,753	633,291
1900	125,428	99,994	292,124	562,916	417,552	662,910
1901	133,328	94,415	317,066	565,615	450,394	660,030
1902	127,931	98,932	594,594	1,028,618	722,525	1,127,550
1903	92,252	74,655	627,741	1,150,592	719,993	1,225,247
1904	56,814	50,247	910,358	1,287,992	967,172	1,338,239
1905	14,184	10,274	1,346,548	1,913,740	1,360,732	1,924,014
1906	8,610	6,052	2,119,764	3,164,807	2,128,374	3,170,859
1907	5,775	4,043	2,436,903	3,777,328	2,441,868	3,781,371
1908	1,044	815	2,665,289	3,709,139	2,666,333	3,709,954
1909	0	0	4,067,709	5,345,802	4,067,709	5,345,802

* Quantities sold or shipped.

According to returns received from the manufacturers, the total quantity of Portland cement (including slag cement) made in Canada, 1909, was 4,146,708 barrels of 350 pounds net, as compared with 3,495,961 barrels in 1908 ; an increase of 650,747 barrels, or 18·6 per cent.

The total quantity of Canadian Portland cement sold in 1909 was 4,067,709 barrels, as compared with 2,665,289 barrels in 1908 ; or an increase of 1,402,420 barrels, or 52·6 per cent.

The total consumption of Portland cement in 1909, including Canadian and imported cements, was 4,209,903 barrels (of 350 pounds net), as compared with 3,134,338 barrels in 1908 ; or an increase of 1,075,565 barrels, or 34·3 per cent.

An interesting feature of the cement industry is the rapid decrease in importation of cement, indicating the increasing ability of Canadian plants to supply the home demand. The imports in 1909, which were 142,194 barrels, amounted to only 3 per cent of the total consumption, as compared with 15 per cent in 1908, and 64 per cent in 1901.

Detailed statistical returns respecting the stock on hand at the beginning and end of the year, the total value and price per barrel, the number of men employed and wages paid, the quantity and value of the imports etc. for the years 1908 and 1909 are shown in comparative form in the following table :—

Comparison of Production, Sales, and Imports of Portland Cement in 1908 and 1909.

——	1908.	1909.	Increase.	%	Decrease.	%
Cement sold..... ..... Bls.	2,665,289	4,067,709	1,402,420	52·6	.....	.....
Cement manufactured..... "	3,495,961	4,146,708	650,747	18·6	.....	.....
Stock on hand, Jan. 1..... "	383,349	1,098,239	714,890	186·5	.....	.....
" " Dec. 31..... "	1,214,021	1,177,238	.....	.....	36,783	3·0
Value of cement sold ..... $	3,709,139	5,345,802	1,636,663	44·1	.....	.....
Average price per bl..... $	1.39	1.31	.....	.....	0·08	5·6
Wages paid..... $	1,275,638	1,266,128	.....	.....	9,510	7·5
Men employed..... No.	3,029	2,498	.....	.....	531	17·5
Imports of Portland cement..Bls.	469,049	142,194	.....	.....	326,855	69·7
Value of cement..... $	531,045	166,669	.....	.....	364,376	68·6
Average price per bl..... $	1.13	1.17	0.04	3·5	.....	.....
Total consumption of cement in Canada..... .....Bls.	3,134,338	4,209,903	1,075,565	34·3	.....	.....
No. of completed plants operated...	23	22	.....	.....	1	4·3
Total daily capacity of operating plants as at Dec. 31. .....Bls.	27,500	23,050	.....	.....	4,450	16·2

* The Canada Cement Company have made a somewhat more conservative estimate of the capacities of their several plants than was made by the previous operators.

The production of Portland cement in 1909 was derived from 22 operating plants with a total daily capacity of 23,050 barrels, equivalent to about 6,915,000 barrels per year of 300 operating days. This capacity is about 50 per cent in excess of the present rate of consumption. It will be observed, however, that the consumption in 1909 showed an increase of 34 per cent over that of 1908, and should a similar rate of increase be maintained during the next two years, it would require a fairly steady operation of present plants to supply demand. The operating plants were distributed as follows: one in Nova Scotia, using blast furnace slag; one in Manitoba, making a natural Portland cement; one in British Columbia, two in Alberta, and three in Quebec using limestone and clay; and fourteen in Ontario, of which, eleven used marl and three limestone. The mills of the Imperial Cement Company, Ltd., Owen Sound, and the Colonial Portland

Cement Co., Wiarton, were idle throughout the year, the former Company's affairs having been placed in the hands of an assignee, and the latter undergoing reorganization, the new Company to be known as The Crown Portland Cement Company, Ltd. Both of these Companies used marl. The total daily capacity of the plants using marl was 7,350 barrels, as compared with 15,700 barrels per day for all other plants. The two marl plants not operated are equipped for a daily capacity of 1,100 barrels. Of the total quantity of cement made in 1909, 810,706 barrels were made from marl and 3,336,002 barrels from limestone and slag. In 1908 there were 1,573,090 barrels made from marl and 1,922,871 barrels from limestone and slag.

It is not possible to give the *detailed* statistics of production in each of the provinces separately, as returned to the Department, without divulging confidential returns. The production in Ontario may be separately stated, however, and that of the other provinces grouped in one statement as follows :—

Cement Production in Ontario, 1908 and 1909.

——		1908.	1909.	Increase.	%	Decrease.	%
Cement sold	Bls.	1,518,886	2,462,027	943,141	62·1	.....	
Cement manufactured	"	2,016,737	2,283,263	266,526	13·2	.....	
Stock on hand, Jan. 1	"	314,579	765,873	451,294	143·5	.....	
Stock on hand, Dec. 31	"	812,430	587,109	.....	.....	225,321	27·7
Value of cement sold	$	1,909,815	3,084 218	1,174,403	61·5	.....	
Wages paid	$	636,955	606,639	.....	.....	30,316	4·8
Men employed	No.	1,619	1,340	.....	.....	279	17·2
Total daily capacity of operating plants	Bls.	14,900	12,450	.....	.....	2,450	16·4

Cement Production in other Provinces, 1908 and 1909.

——		1908.	1909.	Increase.	%	Decrease.	%
Cement sold	Bls.	1,066,403	1,605,682	539,279	50·6	.....	
Cement manufactured	"	1,479,224	1,863,445	384,221	26·0	.....	
Stock on hand, Jan. 1	"	68,770	332,366	263,596	383·3	.....	
Stock on hand, Dec. 31	"	401,591	590,129	188,538	46·9	.....	
Value of cement sold	$	1,799,324	2,261,584	462,260	25·7	.....	
Wages paid	$	6?8,683	659,489	22,806	3·6	.....	
Men employed	No.	1,410	1,158	.....	.....	252	17·9
Total daily capacity of operating plants	Bls.	12,600	10,000	.....	.....	2,600	20·6

Statistics of the annual production of Portland cement for a number of years showing the quantity made, the quantity sold, stocks on hand at the end of the year, value of sales, etc., are shown in the next table :—

Annual Production of Portland Cement.

Year.	Quantity Made.	Quantity Sold.	On hand Dec. 31.	Value of Sales.	Average per barrel.	Daily Capacity.
	Barrels.	Barrels.	Barrels.	$	$ cts.	Barrels.
1897	.....	119,763	.....	209,380	1 75	.....
1898	.....	163,084	.....	324,168	1 99	.....
1899	.....	255,366	.....	513,983	2 01	.....
1900	.....	292,124	.....	562,916	1 91	.....
1901	360,160	317,066	58,094	565,615	1 78	.....
1902	562,335	594,594	33,446	1,028,618	1 73	3,900
1903	714,136	627,741	128,386	1,150,592	1 83	4,850
1904	908,990	910,358	112,051	1,287,992	1 41	.....
1905	1,541,568	1,346,548	306,466	1,913,740	1 42	8,000
1906	2,152,562	2,119,764	302,356	3,164,807	1 49	10,500
1907	2,491,513	2,436,093	354,435	3,777,328	1 55	14,400
1908	3,495,961	2,665,289	1,214,021	3,709,139	1 39	27,500
1909	4,146,708	4,067,709	1,777,238	5,345,802	1 31	23,050

Prices :—Manufacturers' prices of cement in car lots, cost of package excluded, as quoted by the Canadian Cement and Concrete Review, were as follows :—

Toronto :—During the first three months of the year, prices ranged from $1.55 to $1.75 per barrel ; from April to December, the range was from $1.30 to $1.65.

Montreal :—Quotations during the first three months, $1.65 to $1.75 ; April to December, $1.35 to $1.65.

Winnipeg :—Quotations throughout the year, $2.25 to 2.40 per barrel.

Imports and Exports :—There has been very little cement exported from Canada during past years, the value of the exports in 1907 being $9,618 ; this was increased in 1908 to a value of $34,591, and a further increase in 1909 is recorded, the exports being valued at $113,362. The quantity exported is not shown in the Customs Reports.

The imports of Portland cement, which, previous to 1904, were larger than the Canadian production, have been decreasing since 1906, and amounted in 1909 to only 142,194 barrels, or about 3 per cent of the consumption ; as compared with imports of 469,049 barrels, or 15 per cent of the consumption in 1908. A duty of $12\frac{1}{2}$ cents per 100 pounds, equivalent to $43\frac{3}{4}$ cents per barrel of 350 pounds net, is levied on imports. The weight of the package is, however, included for purposes of duty.

During 1907 and 1908 the greater part of the cement imported was from the United States, over 53 per cent of the imports being from that source during the latter year. During 1909, however, over 64 per cent of the imports was derived from Great Britain and less than 30 per cent from the United States.

The imports of cement during 1908 and 1909 by countries were as follows :—

	1908.			1909.		
	Cwt.	%	Value.	Cwt.	%	Value.
			$			$
Great Britain	601,527	36·6	202,139	322,149	64·7	104,060
United States	902,576	55·0	283,899	145,962	29·3	51,222
Belgium	128,738	7·8	40,856	15,761	3·2	5,029
Other countries	8,831	0·5	4,151	13,806	2·8	6,358
Totals	1,641,672	99·9	531,045	497,678	100·0	166,669
Equivalent in barrels	469,049			142,194		

Statistics of the export of cement since 1891 and of the imports since 1880 are given in the next two tables :—

Exports of Cement.

Calendar Year.	Value.	Calendar Year.	Value.	Calendar Year.	Value.
	$		$		$
1891	2,881	1898	2,117	1904	5,494
1892	938	1899	2,733	1905	3,143
1893	1,172	1900	3,296	1906	7,551
1894	482	1901	1,514	1907	9,618
1895	937	1902	2,267	1908	34,591
1896	1,328	1903	2,851	1909	113,362
1897	644				

Imports of Cement into Canada.

Fiscal Year.	Cement and Mfrs. of, N. E. S.	Hydraulic Cement.		Portland Cement.	
		Barrels.	Value.	Barrels.	Value.
	$		$		$
1880	28	10,034	10,306		55,774
1881	298	7,812	7,821		45,646
1882	86	11,945	13,410		66,579
1883	548	11,659	13,755		102,537
1884	1,236	8,606	9,514		102,857
1885	1,315	5,613	5,396		111,521
1886	1,851	6,164	6,028		120,398
1887	1,419	6,160	8,784	102,750	148,054
1888	5,787	5,636	7,522	122,462	177,158
1889	10,668	5,835	7,467	122,273	179,406
1890	5,443	5,440	9,048	192,322	313,572
1891	2,890	3,515	6,152	183,728	304,648
1892	3,394	2,214	2,782	187,233	281,553
1893	2,909	4,896	8,060	229,492	316,179
1894	2,618	1,054	985	224,150	280,841
1895	2,112	5,333	7,001	196,281	242,813
1896	3,672	5,688	8,948	204,407	242,409
1897	4,318	2,494	3,937	210,871	252,587
		Cwt.		Cwt.	
1898	3,263	16,033	7,097	1,073,058	355,264
1899	8,929	1,678	694	1,300,424	467,994
1900	10,452	10,418	4,711	1,301,331	498,607
1901	4,890	17,784	6,865	1,612,432	654,595
1902	12,234	29,585	17,755	1,971,616	833,657
1903	16,281	13,690	6,323	2,316,853	868,131
1904	14,305	12,088	5,391	2,476,388	995,017
1905	18,489	16,961	10,690	4,228,394	1,234,649
1906	27,858	10,794	4,034	2,848,582	963,839
1907 (9 mos.)	16,201	1,192	685	1,551,493	523,120
1908	12,418	18,860	6,710	2,427,381	852,041
1909	5,733	438	466	1,460,850	475,676

* Cement not elsewhere specified and manufactures of cement.

Consumption of Cement.—Although the exports of cement have been increasing during the past two years, the value is still comparatively small, and as the quantity has not been recorded, the consumption has been estimated on the basis of the Canadian production and the imports.

The total consumption of Portland cement in Canada in 1909 was 4,209,903 barrels (736,733 tons): made up of 4,067,709 barrels (711,849 tons) of Canadian cement, or 97 per cent; and 142,194 barrels (24,884 tons) of imported cement, or 3 per cent.

In 1908, the total consumption was 3,134,338 barrels (548,509 tons), of which 85 per cent was made in Canada, and 15 per cent imported.

In 1901, the total consumption was 872,966 barrels (152,769 tons), of which only 36 per cent was made in Canada, and 64 per cent was imported.

Following is an estimate of the consumption of Portland cement in Canada during the past nine years :—

Annual Consumption of Portland Cement.

Calendar Year.	Canadian.		Imported.		Total.
	Barrels.	%	Barrels.	%	Barrels.
1901	317,066	36	555,900	64	872,966
1902	594,594	52	544,954	48	1,139,548
1903	627,741	45	773,678	55	1,401,419
1904	910,358	54	784,630	46	1,694,988
1905	1,346,548	59	918,701	41	2,265,249
1906	2,119,764	76	665,845	24	2,785,609
1907	2,436,093	78	672,630	22	3,108,723
1908	2,665,289	85	469,049	15	3,134,338
1909	4,067,709	97	142,194	3	4,209,903

Quebec.

The Superintendent of Mines for the Province publishes the production of cement in 1909 as 1,011,194 barrels, valued at $1,314,551 ; as compared with a production of 801,695 barrels, valued at $1,127,335, in 1908. All the operating plants in this Province have been acquired by the Canada Cement Company.

Ontario.

Statistics of cement production in Ontario have already been given in detail in tabular form, the total sales for 1909 being 2,462,027 barrels, valued at $3,084,218. There were 14 plants in operation during 1909, of which six controlled by the Canada Cement Company produced the greater part of the cement sold.

Alberta.

There are two operating cement plants in this Province : one at Calgary, now owned by the Canada Cement Company, and a plant at Exshaw owned by the Western Canada Cement and Coal Company. A third plant was under construction at Blairmore by the Rocky Mountain Cement Company, with a proposed capacity of 500 barrels per day.

British Columbia.

There is but one cement plant in this Province, viz., that located at Tod inlet, twelve miles from Victoria, and operated by the Vancouver Portland Cement Co. The capacity of the plant is about 1,000 barrels a day, and during 1909 the Company made about 238,000 barrels of cement.

A feature of special interest in connexion with the cement industry in 1909 was the consolidation of ten plants, incorporated as the Canada Cement Company, Ltd. The following companies entered the consolidation :—

The Vulcan Portland Cement Co., Ltd.,		Longue Point, Que.
The Lakefield	" "	Pointe aux Trembles, Que.
The International	" "	Hull, Que.
The Owen Sound	" "	Shallow Lake, Ont.
The Belleville	" "	Belleville, Ont.
The Lehigh	" "	"
Lakefield	" "	Lakefield, Ont.
The Canadian	" "	Marlbank and Port Colborne, Ont.
The Alberta Portland Cement Co.,		Calgary, Alta.

Following is a list of cement manufacturing companies :—

Name.	Location of Plant.	Head Office.
Sydney Cement Company, Ltd	Sydney, N.S	Sydney, N.S.
Canada Cement Company, Ltd		Montreal, Que.
Montreal Mill No. 1	Longue Point, Que	
" " No. 2	Kilbourn Siding, Que	
International Mill	Hull, Que	
Owen Sound "	Shallow Lake, Ont	
Belleville "	Belleville, Ont	
Lehigh "	" "	
Lakefield "	Lakefield, Ont	
Marlbank "	Marlbank, Ont	
Port Colborne "	Port Colborne, Ont	
Alberta "	Calgary, Alta	
Grey and Bruce Portland Cement Co	Owen Sound, Ont	Owen Sound, Ont.
The Sun Portland Cement Co., Ltd. (In liquidation).	" "	"
The Imperial " "	" "	"
Hanover " "	Hanover, Ont	Hanover, Ont.
The Ontario " "	Blue Lake, Ont	Brantford, Ont.
The National " "	Durham, Ont	Durham, Ont.
Kirkfield " "	Raven lake, Ont	Toronto, Ont.
Superior " "	Orangeville, Ont	Orangeville, Ont.
The Maple Leaf " "	Atwood, Ont	Listowel, Ont.
The Crown " "		Wiarton, Ont.
The Commercial Cement Co., Ltd	Babcock, Man	Winnipeg, Man.
The Western Canada Cement & Coal Co	Exshaw, Alta	Ottawa, Ont.
Vancouver Portland Cement Co	Tod inlet, B.C	Victoria, B.C.

Following is a list of companies building, or contemplating the erection of mills :—

Ben Allan Portland Cement Co	Owen Sound, Ont.
Lake Medal " "	Hamilton, Ont.
Bell's Lake " "	Markdale, Ont.
The Brant " "	Brantford, Ont.
The Rocky Mountain Cement Co	Blairmore, Alta.
Canada Cement Co., (Quebec Mill)	Montreal, Que.

CLAY PRODUCTS.

The clay products made in Canada comprise brick of various kinds, including common and pressed brick, paving, ornamental, and fancy brick, firebrick, porous fireproofing brick and blocks, sewerpipe, drain tile, pottery and sanitary ware.

There are a large number of manufacturers of brick whose individual output is comparatively small, and in past years it has been somewhat difficult to obtain complete returns of production. Our circular inquiry for 1909 was supplemented by a personal canvas in the Province of Ontario, with very satisfactory results, there being an evident willingness on the part of practically all producers to make the statistics as complete as possible.

The prompt co-operation of all clay manufacturers in furnishing returns of production would enable the Department to publish the statistics much earlier than has hitherto been possible.

The statistics of production given herewith represent actual sales; material produced but held in stock over the end of the year, not being included until disposed of.

According to the returns received the total value of the clay products sold in 1909 was $6,450,840, as compared with a total valuation in 1908 of $4,500,702; an increase of $1,950,138, or 43·3 per cent. The total value of the clay products sold in 1907 was $5,772,117; in 1906 it was $5,072,635, and in 1905, $4,709,842.

Of the total value of the clay production in 1909, about 76 per cent was made up of building and paving brick, and about 16 per cent of sewerpipe and tile.

The production by classes is shown as follows:—

Production of Clay Products, 1908 and 1909.

	1908.			1909.		
	Quantity.	Value.	Per M	Quantity.	Value.	Per M
Bricks—		$	$ cts.		$	$ cts.
Common..... No.	353,261,268	2,611,554	7 39	539,228,708	4,212,424	7 81
Pressed..... "	53,480,764	517,180	9 67	57,264,656	630,677	11 01
Paving..... "	3,719,961	59,456	15 98	3,759,803	67,408	17 93
Ornamental.....	.....	18,535	.....	.....	8,866	.....
Firebrick, and fireclay shapes, etc.....	.....	110,302	.....	.....	78,132	.....
Fireproofing, and architectural terra-cotta, etc.	.....	170,211	.....	.....	113,866	.....
Pottery.....	.....	200,541	.....	.....	285,285	.....
Sewerpipe.....	.....	514,362	.....	.....	645,722	.....
Tiles, drain.....	20,100,261	298,561	14 85	27,571,097	408,440	14 81
Totals.....	.....	4,500,702	.....	.....	6,450,840	.....

Production of Clay Products, 1907.

		1907.		
		Quantity.	Value.	Per M
			$	$ cts.
Bricks—				
Common	No.	439,015,556	3,455,524	7 87
Pressed	"	78,922,092	794,722	10 07
Paving	"	3,617,720	72,354	20 00
Ornamental			47,288	
Firebrick and fireclay shapes, etc			131,322	
Fireproofing and architectural terra-cotta, etc			89,389	
Pottery			253,809	
Sewerpipe			667,100	
Tiles, drain			260,609	
Total			5,772,117	

By provinces the production during the past four years has been as follows:—

Production of Clay Products by Provinces, 1906-9.

Province.	1906.	1907.	1908.	1909.
	$	$	$	$
Nova Scotia	160,506	125,560	117,833	188,185
New Brunswick	49,220	57,377	75,513	65,570
Quebec	769,458	1,214,108	893,717	1,153,832
Ontario	3,136,870	3,123,372	2,476,152	3,425,841
Manitoba	517,065	466,432	265,091	559,008
Saskatchewan	136,022	125,459	87,566	145,516
Alberta	180,217	353,672	240,384	442,486
British Columbia	123,277	306,137	344,446	470,402
	5,072,635	5,772,117	4,500,702	6,450,840

Annual Value of Production of Clay Products, 1899-1909.

Calendar Year.	Value.	Calendar Year.	Value.	Calendar Year.	Value.
	$		$		$
1899	2,988,099	1903	4,034,289	1907	5,772,117
1900	3,195,105	1904	3,841,560	1908	4,500,702
1901	3,382,706	1905	4,709,842	1909	6,450,840
1902	3,625,489	1906	5,072,635		

Important as are Canada's clay industries, the output is far from sufficient to supply the home demand. The exports are almost negligible, the only item recorded being that of building brick, of which the exports in 1909 were 365,000

valued at $2,255, as compared with 2,344,000 in 1908, valued at $9,047. The imports of clay and clay products on the other hand are very considerable, amounting in value during the calendar year 1909, to $3,247,539. These imports include chiefly manufactured products, such as brick, tile, earthenware and china of all kinds. There is also, however, quite a large importation of clays, such as the better grades of china-clay, fireclay etc. The imports of brick and tile were valued at $1,249,450. Earthenware and china were imported to a value of $1,781,759, and clays to a value of $216,330.

Statistics of the imports of clay products during the fiscal years 1908 and 1909, and the calendar year 1909, are shown hereunder.

Imports of Clay Products, 1908 and 1909.

Imports.	12 months ending March, 1908.	12 months ending March, 1909.	12 months ending December, 1909.
	$	$	$
Brick and tiles—			
Bath brick	1,834	4,432	1,495
Building brick	139,105	108,773	195,360
Paving brick	61,346	101,187	139,366
Firebrick of a kind not made in Canada	639,347	350,457	485,994
Drain tile, not glazed	2,080	2,394	2,785
Drain pipe, sewerpipe, etc	125,747	106,399	170,280
Mfgs. of clay, N.O.P	110,097	141,391	254,170
	1,079,556	815,033	1,249,450
Earthenware and chinaware—			
Brown coloured	22,847	28,273	36,673
Demijohns, churns, and crocks	17,836	10,571	8,888
Tableware of china, porcelain, white granite	1,555,517	1,202,537	1,212,365
China and porcelain	109,446	87,798	87,467
Tiles or blocks of	45,836	43,299	56,974
Earthenware tiles, N.O.P	116,480	79,854	81,393
Mfgs. of earthenware, N.O.P	83,309	66,932	78,063
Earthenware, N.O.P	239,513	197,623	219,936
	2,190,784	1,716,887	1,781,759
Clays—			
China-clay	97,236	90,922	100,066
Fireclay	155,873	77,146	86,161
Pipe-clay	319	887	310
Clays, all other, N.O.P	14,292	21,280	29,793
	267,720	190,235	216,330
Grand total	3,538,060	2,722,155	3,247,539

In addition to the above imports, there is also a considerable annual importation of "chalk, china or Cornwall stone, cliff stone and feldspar, fluorspar magnesite, ground or unground," much of which is no doubt used in connexion with the manufacture of clay products. The value of these imports during the fiscal year ending March, 1909, was $81,675; of which, $55,909 worth was from

the United States and $25,233 from Great Britain. The value of the imports under this item during the calendar year 1909 was $96,747. There is also an annual importation of "baths, bath tubs, basins, closets, lavatories, urinals, sinks, and laundry tubs of any material," $157,881 worth during the fiscal year 1909; much of which would possibly come under the class of clay products known as sanitary ware.

The principal sources of the imports given in the above table for the fiscal year ending March, 1909, are shown in the next table. It will be observed that of the total, the largest proportion, $1,397,845 in value or over 51 per cent, was from Great Britain. The value of the imports from the United States was $887,400, or 32 per cent of the total; Germany supplied $187,381 worth, or about 7 per cent; France, Austria-Hungary, and Japan were also important sources of clay products, particularly of the manufactures of table ware, chinaware, etc.

Imports of Clay Products during the twelve months ending March, 1909, showing countries of origin.

Imports.	Great Britain.	United States.	Germany.	France.	Austria-Hungary.	Japan.	Other Countries.	Total.
	$	$	$	$	$	$	$	$
Brick and tiles—								
Bath brick	1,422	3,010						4,432
Building brick	20,493	88,260					20	108,773
Paving brick	75,497	25,468		222				101,187
Firebrick, of a class or kind not made in Canada	54,278	295,879	291	9				350,457
Drain tile, not glazed	351	2,043						2,394
Drain pipe, sewerpipe and earthenware fittings therefor, chimney linings or vents, chimney tops and inverted blocks, glazed or unglazed	47,206	59,162					31	106,399
Manufactures of clay, N.O.P.	52,759	88,414	142	46			30	141,391
Total	252,006	562,236	433	277			81	815,033
Earthenware and chinaware—								
Brown or coloured earthen and stoneware, and Rockingham ware	9,591	17,922	234	20	245	218	43	28,273
C.C. or cream coloured ware, decorated, printed or sponged, and all earthenware, N.O.P	125,069	37,805	7,046	1,630	2,016	21,150	2,907	197,623
Demijohns, churns or crocks	1,993	8,385			61	94	38	10,571
Tableware of china, porcelain, white granite or ironstone	832,307	29,963	160,281	93,082	57,904	26,152	2,848	1,202,537
China and porcelain ware, N.O.P	25,606	13,357	15,660	5,786	9,006	16,526	1,857	87,798
Tiles or blocks of earthenware or stone prepared for mosaic flooring	10,663	31,270		1,167			199	43,299
Earthenware tiles, N.O.P	40,612	39,234					8	79,854
Manufactures of earthenware, N.O.P.	20,102	38,646	1,970	2,991	1,073	1,899	251	66,932
Total	1,065,943	216,582	185,191	104,676	70,305	66,039	8,151	1,716,887

Imports of Clay Products during the twelve months ending March, 1909, showing countries of origin—*Continued.*

Imports.	Great Britain.	United States.	Germany.	France.	Austria-Hungary.	Japan.	Other Countries.	Total.
	$	$	$	$	$	$	$	$
Clays—								
China clay, ground or unground	59,795	30,092	1,035					90,922
Fireclay, ground or unground	18,492	58,483	171					77,146
Pipe-clay, ground or unground	308	28	551					887
Clays, all other, N.O.P.	1,301	19,979						21,280
Total	79,896	108,582	1,757					190,235
Grand Total	1,397,845	887,400	187,381	104,953	70,305	66,039	8,232	2,722,155
Per cent of total	51·35	32·60	6·88	3·86	2·58	2·43	0·30	100·00
Baths, bath-tubs, basins, closets, lavatories, urinals, sinks and laundry-tubs of any material.	25,832	132,024			21	4		157,881
Chalk, china or Cornwall stone, cliff stone, and feldspar, fluorspar magnesite, ground or unground	25,233	55,909	325	181			27	81,675

A record of the total annual value of the imports of clay products since 1900 is shown in the next table. In ten years Canada has imported clay products to the value of over $22,000,000. The increase over the ten year period was about 122 per cent. Brick and tile imports in the ten years have increased 458 per cent, earthenware and chinaware over 78 per cent, and clays over 54 per cent.

These statistics indicate in a striking manner the possibilities for the development of Canada's clay industries.

Imports of Clay Products (total value) 1900–9.

Fiscal Year.	Brick and Tile.	Earthenware and Chinaware	Clays.	Total.
	$	$	$	$
1900	145,914	959,526	122,965	1,228,405
1901	133,343	1,114,677	141,251	1,389,271
1902	172,281	1,275,093	140,521	1,587,895
1903	157,783	1,406,610	176,416	1,740,809
1904	259,421	1,611,356	144,706	2,015,483
1905	761,756**	1,636,214	176,805	2,574,775
1906	1,000,372	1,692,359	220,504	2,913,235
1907*	770,686	1,422,880	178,240	2,371,806
1908	1,079,556	2,190,784	267,720	3,538 060
1909	815,033	1,716,887	190,235	2,722,155
	5,296,145	15,026,386	1,759,363	22,081,894

* 9 months ending March 1907.

** Includes fireclay classified as "for use in process of manufactures."

In view of the large imports of clay products into Canada, it may be of interest to quote herewith the Customs duties affecting these goods. Canadian pottery manufacturers claim to be unable to meet the competition of imported pottery, particularly that from England. The total duties collected on clay products during the fiscal year 1909 were $490,294.80, or an average of about 22½ per cent *ad valorem*, on the dutiable imports, or 18 per cent on the total imports of clay goods, including those entered free.

Canadian Customs Duties on Clay Products.

(From the Customs Tariff, 1907, revised 1910).

Item.	—	British Preferential Tariff.	Intermediate Tariff.	General Tariff.
281	Firebrick of a class or kind not made in Canada.....	Free.	Free.	Free.
282	Building brick, paving brick, and mfgs. of clay or cement (N.O.P).....	12½ %	20 %	22½ %
283	Drain tiles not glazed.....	15 "	17½ "	20 "
284	Drain pipes, sewerpipes, and earthenware fittings therefor, chimney linings or vents, chimney tops and inverted blocks, glazed or unglazed, earthenware tiles (N.O.P.).	25 "	32½ "	35 "
285	Tiles or blocks of earthenware or of stone prepared for mosaic flooring.....	20 "	27½ "	30 "
286	Earthenware and stoneware, viz., demijohns, churns or crocks.....	20 "	27½ "	30 "
287	Tableware of china, porcelain, white granite or ironstone.	15 "	27½ "	27½ "
288	Earthenware and stoneware, brown or coloured, and Rockingham ware "C.C." or cream coloured ware, decorated, printed or sponged, and all earthenware, (N.O.P.).....	20 "	27½ "	30 "
289	Closets, urinals, basins, lavatories, baths, bath tubs, sinks, and laundry tubs of earthenware, stone, cement or clay or of other material.....	20 "	30 "	35 "
295	Clays, including china-clays, fireclay and pipe-clay, not further manufactured than ground; ganister and sand; gravels; earths, crude only.	Free.	Free.	Free.

Clay Building Brick:— The total production of clay building brick, including the common and pressed varieties, but excluding ornamental, paving and firebrick is shown by provinces for the years 1907, 1908, and 1909 in the next table.

In 1907, the total production was 517,937,648, valued at $4,250,246 : made up of 439,015,556 common, valued at $3,455,524, or an average value per thousand of $7.87; and 78,922,092 pressed brick, valued at $794,722, or an average value per thousand of $10.07.

In 1908, the total production was 406,742,030, valued at $3,128,734 : made up of 353,261,268 common, valued at $2,611,554, or an average value per thousand of $7.39; and 53,480,764 pressed brick, valued at $517,180, or an average value per thousand of $9.67.

In 1909, the total production was 596,493,364, valued at $4,843,101 : made up of 539,228,708 common, valued at $4,212,424, or an average value per thousand of $7.81; and 57,264,656 pressed brick, valued at $630,677, or an average value per thousand of $11.01.

Production of Clay Building Brick (Common and Pressed) 1907, 1908, and 1909.

	1907.		1908.		1909.	
		$		$		$
Nova Scotia.	19,646,000	110,338	9,125,000	56,064	18,875,000	114,795
New Brunswick...	4,941,141	36,937	6,594,011	54, 73	6,170,000	44,330
Quebec	104,394,709	715,922	90,667,177	601,874	101,471,567	690,918
Ontario....	287,930,763	2,311,499	221,600,575	1,664,184	322,524,414	2,557,068
Manitoba	45,094,180	465,282	26,818,000	254,591	59,110,000	544,548
Saskatchewan	12,024,070	123,459	8,262,9 6	87,566	14,416,770	144,316
Alberta..	31,384,740	353,672	25,521,911	240,336	45,479,855	441,606
British Columbia..	12,522,045	131,137	18,152,362	169,546	28,445,758	305,520
Totals.....	517,937,648	4,250,246	406,742,030	3,128,734	596,493,364	4,843,101

The exports and imports of building brick since 1891 and 1880 respectively are shown in the two following tables. The exports have never been large, averaging for a number of years past about $6,000 in value per annum, but falling in 1909 to a value of $2,255. The annual imports for a number of years previous to 1903 averaged only about $20,000 in value; during the past six years, however, the value of the imports has varied from $100,000 to nearly $200,000 per annum. During the calendar year 1909 the imports were 27,972,000 brick, valued at $195,360: of which, 1,738,000 valued at $21,680, an average of $12.47 per M, were imported from Great Britain; and 26,234,000 valued at $173,680, an average of $6.62 per M, from the United States.

Exports of Building Brick.

Calendar Year.	M.	Value.	Calendar Year.	M.	Value.	Calendar Year.	M.	Value.
		$			$			$
1891.....	246	1,163	1898.....	65	442	1904.....	696	5,357
1892.....	1,963	12,192	1899.....	172	1,351	1905.....	754	5,888
1893.....	6,073	44,110	1900.....	546	4,528	1906.....	697	6,541
1894.....	1,095	7,405	1901.....	646	5,189	1907.....	802	6,193
1895.....	1,655	8,665	1902.....	2,110	12,786	1908.....	2,344	9,047
1896.....	983	5,678	1903.....	891	5,699	1909.....	365	2,255
1897.....	573	2,679						

Imports of Building Brick.

Fiscal Year.	M.	Value.	Fiscal Year.	M.	Value.	Fiscal Year.	M.	Value.
		$			$			$
1880.....	340	2,067	1890.....	1,933	12,500	1900.....	1,792	19,305
1881.....	415	4,281	1891.....	589	9,744	1901.....	2,800	20,677
1882.....	3,500	24,572	1892.....	621	5,075	1902.....	4,087	33,802
1883.....	1,448	14,234	1893.....	1,489	14,108	1903.....	2,881	28,493
1884.....	3,263	20,258	1894.....	2,220	18.320	1904.....	13,455	117,468
1885.....	3,108	14,632	1895.....	575	4,705	1905.....	25,515	168,122
1886.....	983	5,929	1896.....	1,057	23,189	1906.....	21,934	194,897
1887.....	276	2,440	1897.....	2,094	10,336	1907 (9mos)	8,495	88,144
1888.....	2,483	20,720	1898.....	639	6,652	1908.....	13,790	139,105
1889.....	2,590	24,585	1899.....	2,611	21,306	1909.....	10,894	103,773

Prices :—The price of brick is somewhat lower in the eastern parts of Canada than in the west. The average price of common brick at the yard in 1907, according to the returns furnished by the producers, ranged from a minimum of $5.47 in Nova Scotia to a maximum of $10.67 in Alberta. Prices in 1908 averaged somewhat higher in the Maritime Provinces, but lower in Ontario and the west ; this was a year of comparative dullness in the building trades with a falling off in production. In 1909, however, the demand became brisk again and prices averaged somewhat higher, running from a minimum of $5.69 in Nova Scotia to a maximum of $9.73 in British Columbia.

The following table shows the average prices of common and pressed brick in the several provinces during 1907, 1908, and 1909. These are the average values of brick sold at the yard as furnished by the producers.

Average Prices per Thousand of Common and Pressed Brick.

—	Common Brick.			Pressed Brick.		
	1907.	1908.	1909.	1907.	1908.	1909.
Nova Scotia.	$ 5.47	$ 5.81	$ 5.69	$12.53	$13.84	$12.36
New Brunswick. ..	7.45	8.17	7.14	8.21	16.70	12.00
Quebec.....	6.43	6.37	6.38	11.60	11.62	14.00
Ontario.	7.61	7.24	7.71	9.45	8.74	9.46
Manitoba.	10.19	9.24	9.14	13.67	15.45	12.00
Saskatchewan.....	10.43	10.46	9.66	.....	11.18	14.00
Alberta.....	10.67	8.60	9.21	17.89	12.97	13.03
British Columbia..	10.45	9.21	9.73	20.95	20.40	31.05
Canada.	7.87	7.39	7.81	10.07	9.67	11.01

Ontario :—Over 52 per cent of the total production of building brick in Canada in 1909 was made in the Province of Ontario, and of the Ontario production over 47 per cent was made in the county of York, so that the City of Toronto and vicinity produces about one quarter, or including the county of Halton, nearly 30 per cent of the total brick production of Canada; Wentworth county, or the vicinity of Hamilton, is perhaps the next important brick centre, producing over 7 per cent of the Ontario output. The counties of Carleton and Russell, or the Ottawa district, are the next in order with a little under 7 per cent. Other important districts are Algoma and Nipissing, which cover a wide area, and the western counties of Middlesex, Kent, Waterloo, and Simcoe. These eleven counties contributed over 82 per cent of the Ontario production. Practically all the pressed brick, reported as such, was made in Toronto and vicinity.

The production of these counties in 1909 is shown in tabular form herewith.

Production of Common and Pressed Brick by Principal Counties.

County.	Common.			Pressed.			Total Value.	Per cent.
	No.	Value.	Per M.	No.	Value.	Per M.		
		$	$ c.		$	$ c.	$	%
York	118,604,500	969,032	8 17	27,125,800	250,461	9 23	1,219,493	47·69
Halton	9,705,300	72,033	7 42	12,790,900	126,662	9 90	198,695	7·77
Wentworth	26,799,250	188,577	7 04				188,577	7·37
Carleton	12,903,165	101,618	7 88				101,618	3·97
Algoma	8,667,000	81,250	9 37	200,000	2,800	14 00	84,050	3·29
Russell	11,000,000	66,250	6 02				66,250	2·59
Nipissing	6,500,000	55,950	8 61				55,950	2·19
Middlesex	7,023,050	54,030	7 69	60,000	510	8 50	54,540	2·13
Kent	7,592,000	48,020	6 33				48,020	1·88
Waterloo	6,842,160	46,968	6 86				46,968	1·84
Simcoe	6,108,000	44,280	7 25				44,280	1·73
Total, 11 counties	221,744,425	1,728,008	7 79	40,176,700	380,433	9 47	2,108,441	82·45
Total, other counties	59,934,089	442,493	7 38	669,200	6,134	9 17	448,627	17·55
Total, Ontario	281,678,514	2,170,501	7 71	40,845,900	386,567	9 46	2,557,068	100·00

The annual production of common and pressed brick in this Province since 1898, as ascertained by the Ontario Bureau of Mines, is shown in the following table. The figures show the total quantity and value of the brick made, as distinguished from the sales given in the previous table.

Building Brick made in Ontario since 1898.

(From the reports of the Ontario Bureau of Mines.)

	Common Brick.			Pressed Brick.		
	M.	Value.	Average per M.	M.	Value.	Average per M.
		$	$ cts.		$	$ cts.
1898	170,000	914,000	5 376	8,970	100,344	11 187
1899	233,898	1,313,750	5 617	10,808	105,000	9 715
1900	240,430	1,379,590	5 738	11,562	114,419	9 896
1901	259,265	1,530,460	5 903	12,846	104,394	8 127
1902	220,500	1,411,000	6 399	19,755	144,171	7 298
1903	230,000	1,561,700	6 790	23,703	218,550	9 220
1904	200,000	1,430,000	7 150	26,857	226,750	8 443
1905	250,000	1,937,500	7 750	26,000	234,000	9 000
1906	300,000	2,157,000	7 190	39,860	337,795	8 475
1907	273,882	2,109,978	7 704	69,763	648,683	9 298
1908	222,361	1,575,875	7 087	56,167	485,819	8 649
1909	246,308	1,916,147	7 779	53,167	490,571	9 227

In reviewing the brick industry of Ontario, the Director of the Bureau of Mines states "The demand for brick was active during the year, especially in the larger cities, building operations in Toronto, for instance, which is essentially a city of brick, being decidedly brisk. A large quantity of brick is manufactured in and around Toronto, many of the brick-yards being extensive and well equipped. Reference to the figures published by the Bureau as to the production of brick, shows that the average value at the yard has risen from $5.73 per thousand in 1901 to $7.78 per thousand in 1909, an increase of over 35 per cent. The cost of brick constructions has been heavily affected during the same time, since the cost of labour has experienced an advance probably quite as great.

"There has of late years been a marked improvement in the quality of brick made in first-class yards. Kilns of modern construction burn harder and more evenly, and there is a smaller proportion of soft brick. The present taste in brick houses too, does not demand the same uniformity of colour that was formerly insisted upon; in fact, a variety of shade, instead of being objected to, is rather desired. There is also a much greater range of products than was made years ago. From white and buff to cherry red, and up to a dark even purplish hue, bricks of all tints and shades are freely used, and pleasing effects are sometimes obtained by employing clinker or overburned bricks, greenish or yellowish in colour."

Paving Brick:—Paving bricks are made in Ontario only at West Toronto, from shale found on the banks of the Humber river. The annual production has been fairly constant at from 3,000,000 to 5,000,000 brick per season. The output finds a market chiefly in Toronto. Statistics of production are available since 1897 and are shown in the next table. The average price per thousand has varied from $8 to $20.

In 1909 the number of paving brick sold was 3,759,803, valued at $67,408 ; while during the same year there were imported paving brick valued at $139,366. Statistics of production and imports of paving brick are shown in the two tables following :—

Annual Production of Paving Brick (a).

Year.	M.	Value.	Average per M.	Year.	M.	Value.	Average per M.
		$	$ cts.			$	$ cts.
1897	4,568	45,670	10 00	1904	4,436	55,450	12 50
1898				1905	4,500	54,000	12 00
1899	5,300	42,550	8 03	1906	3,000	45,000	15 00
1900	2,710	26,950	9 94	1907	3,618	72,354	20 00
1901	3,689	37,000	10 03	1908	3,720	59,456	15 98
1902	4,211	42,000	9 97	1909	3,760	67,408	17 93
1903	3,789	45,288	11 95				

(a) Figures previous to 1907 compiled from Ontario Bureau of Mines.

Imports of Paving Brick.*

Fiscal Year.	M.	Value.	Average per M.	Fiscal Year.	M.	Value.	Average per M.
		$	$ cts.			$	$ cts.
1895	275	5,006	18 20	1903	1,337	18,811	14 07
1896	918	10,132	11 04	1904	1,986	29,753	14 98
1897	52	719	13 83	1905	2,350	32,578	13 86
1898	367	2,337	6 37	1906	4,104	46,008	11 21
1899	1,583	23,648	14 94	1907 (9 mos.)	2,182	23,256	10 66
1900	2,175	35,644	16 39	1908	5,340	61,346	11 49
1901	900	10,414	11 57	1909		101,187	†
1902	1,030	16,788	16 30				

* Duty 20 per cent.

† The imports during July, 1908, under the general tariff, are reported as 6,581 M, value $7,317, an apparent error. There appears also to be an error in the entries for July, August, and September of the same year. The total number has, therefore, been omitted. The actual value of the imported brick varies from $10 to $12 per M.

Fireclay and Fireclay Products :—There are a number of clays from different localities that have been used in the manufacture of refractory brick or firebrick, and for furnace linings, etc., which have been usually termed fireclays. These include clays found with the Coal Measures at Westville, Nova Scotia, and at Comox, Vancouver island, also clays found south of Moosejaw, Saskatchewan, and at Clayburn, near the city of Vancouver, British Columbia. Stove lining and other refractory clay products are made at several places in Ontario and Quebec from imported fireclays.

The total value of the sales of fireclay, firebrick, and fireclay products in 1909 was $78,132, as compared with a valuation of $110,302 in 1908 and $131,322 in 1907.

The production of 1909 comprised 1,059,270 firebrick valued at $32,742, or an average of $30.92 per M ; fireclay sold, 4,405 tons valued at $12,390, and other fireclay products valued at $33,000.

Fireclay products in 1908 included 2,415,871 firebrick valued at $70,429, an average of $29.16 per M ; fireclay sold, 1,984 tons valued at $8,121, and other fireclay products valued at $31,752. The 1907 production comprised 4,323,179 firebrick valued at $113,322, an average of $26.21 per M ; and other fireclay shapes to the value of $18,000.

Firebricks were imported during the calendar year 1909 to the value of $485,994, of which $426,602 worth was derived from the United States and $59,392 from Great Britain.

The imports during the fiscal year ending March, 1909, were valued at $350,457, and during the fiscal year ending March, 1908, the imports were valued at $639,347. The imports of fireclay during the calendar year 1909 were valued at $86,161, and were derived chiefly from the United States and Great Britain.

During the fiscal year ending March, 1909, fireclay was imported to the value of $77,146, and the imports during the fiscal year ending March, 1908, were valued at $155,873.

Statistics of the imports of firebrick and of fireclay for a number of years are shown as follows : —

Imports of Firebrick and Fireclay, 1900-9.

Fiscal Year.	Fireclay.	Firebrick.	Fiscal Year.	Fireclay.	Firebrick.
	$	$		$	$
1900	59,291	39,535	1905	73,837	44,746
1901	79,530	32,831	1906	131,130	51,892
1902	64,541	45,608	1907*	85,044	349,185
1903	94,509	34,522	1908	155,873	639,347
1904	52,716	38,335	1909	77,146	350,457

* 9 months ending March.

Sewerpipe and Drain Tile :—The total value of the sales of sewerpipe in 1909 was $645,722, as compared with a value of $514,362 in 1908, and a value of $667,100 in 1907.

The imports of drain pipe and sewerpipe during the calendar year 1909 were valued at $170,280 : of which $135,809 worth were imported from the United States; $34,200 from Great Britain, and $271 from other countries. During the

twelve months ending March, 1909, the imports were valued at $106,399, and during the twelve months ending March, 1908, the value was $125,747.

Following is a list of firms manufacturing sewerpipe :—

Standard Drain Pipe Co. of St. Johns	New Glasgow, N.S.
	St. Johns, Que.
Ontario Sewer Pipe Company	Toronto, Ont.
Dominion Sewer Pipe Company	"
Hamilton & Toronto Sewer Pipe Co., Ltd	Hamilton, Ont.
B. C. Pottery Company	Victoria, B.C.

There was a considerably increased demand for drain title in 1909, and the total sales reported to this Branch were 27,571,097 valued at $408,440, an average of $14.81 per M; as compared with sales of 20,100,261 valued at $298,561, or an average of $14.85 per M, in 1908. The Ontario Bureau of Mines reports the total quantity made in that Province in 1909 as 27,418,000 valued at $363,550, or an average of $13.25 per M; as compared with 24,800,000 valued at $338,658, or an average value of $13.66 per M, in 1908.

The imports of unglazed drain tile are comparatively small, the value in 1909 being $2,785 only.

Statistics of the annual production of sewerpipe and of the imports of drain tile and sewerpipe, are shown in the next three tables.

Production of Sewerpipe, etc.

Calendar Year.	Value.	Calendar Year.	Value.	Calendar Year.	Value.
	$		$		$
1888	266,320	1896	153,875	1904	440,894
1889	Not available.	1897	164,250	1905	382,000
1890	348,000	1898	181,717	1906	350,045
1891	227,300	1899	161,546	1907	667,100
1892	367,660	1900	231,525	1908	514,362
1893	350,000	1901	248,115	1909	645,722
1894	250,325	1902	301,965		
1895	257,045	1903	317,970		

Production of Drain Tile in Ontario.

(As ascertained by the Ontario Bureau of Mines).

Year.	No.	Value.	Year.	No.	Value.	Year.	No.	Value.
		$			$			$
1891	7,500,000	90,000	1898	22,668,000	225,000	1905	15,000,000	220,000
1892	10,000,000	100,000	1899	21,027,400	240,246	1906	17,700,000	252,500
1893	17,300,000	190,000	1900	19,544,000	209,738	1907	15,578,000	250,122
1894	25,000,000	280,000	1901	21,592,000	231,374	1908	24,800,000	338,658
1895	14,330,000	157,000	1902	17,510,000	199,000	1909	27,418,000	363,550
1896	13,200,000	144,000	1903	18,200,000	227,000			
1897		*	1904	16,000,000	210,000			

* Not stated.

Imports of Drain Tile and Sewerpipe.

Fiscal Year.	Drain Tile (a).	Sewerpipe (b).	Fiscal Year.	Drain Tile (a).	Sewerpipe (b).
	$	$		$	$
1880		33,796	1895	695	20,358
1881		37,368	1896	339	18,957
1882		70,061	1897	416	33,870
1883		70,699	1898	157	29,454
1884	5,585	66,170	1899	1,827	32,071
1885	2,911	66,678	1900	1,383	37,766
1886	1,905	56,048	1901	1,264	54,819
1887	2,183	69,020	1902	269	55,261
1888	4,230	96,967	1903	252	57,100
1889	2,346	80,869	1904	1,637	53,958
1890	3,780	73,654	1905	1,229	101,166
1891	673	86,522	1906	4,727	131,353
1892	473	59,064	1907 (9 mos.)	12,106	93,458
1893	110	38,891	1908	2,080	125,747
1894	53	24,572	1909	2,394	106,399

(a) Drain tile, not glazed.

(b) Drain pipes, sewerpipes, chimney linings, or vents, chimney tops and inverted blocks, glazed or unglazed.

Pottery and Earthenware:—The pottery made from Canadian clays has been, hitherto, chiefly of the common grades, such as flowerpots, jardinieres, crocks, jars, churns, etc. A number of potters make a higher grade product of stoneware, but the majority of these use imported clays. Sanitary ware is made at St. Johns, Que., and other points; but the raw material, including clays and feldspar, is nearly all imported.

The total value of the production of pottery and sanitary ware in 1909, according to returns received, was $285,285; as compared with a valuation of $200,541 reported for 1908. Annual statistics of production are shown herewith.

Annual Production of Pottery.

Calendar Year.	Value.	Calendar Year.	Value.	Calendar Year.	Value.
	$		$		$
1888	27,750	1896	163,427	1903	200,000
1889	Not available.	1897	129,629	1904	140,000
1890	195,242	1898	214,675	1905	120,000
1891	258,844	1899	185,000	1906	150,000
1892	265,811	1900	200,000	1907	253,809
1893	213,186	1901	200,000	1908	200,541
1894	162,144	1902	200,000	1909	285,285
1895	151,588				

Details of the imports of earthenware and chinaware showing the values imported and countries of origin, have already been given on pages 15, 16, and 17.

The total imports in 1909 were valued at $1,781,759, of which the principal item is "tableware of china, porcelain, white granite or ironstone ware," to a value of $1,212,365. Great Britain is the principal source of the imports of this class of clays, but quite large supplies are also obtained from the United States, Germany, France, Austria-Hungary, and Japan.

Imports of Earthenware and Chinaware.

Fiscal Year.	Value.	Fiscal Year.	Value.	Fiscal Year.	Value.
	$		$		$
1880	322,333	1890	695,206	1900	959,526
1881	439,029	1891	634,907	1901	1,114,677
1882	646,734	1892	748,810	1902	1,275,093
1883	657,886	1893	709,737	1903	1,406,610
1884	544,586	1894	695,514	1904	1,611,356
1885	511,853	1895	547,935	1905	1,636,214
1886	599,269	1896	575,493	1906	1,692,359
1887	750,691	1897	595,822	1907 (9 mos.)	1,422,880
1888	697,082	1898	675,874	1908	2,190,784
1889	697,949	1899	916,727	1909	1,716,887

The existence in Canada of commercially available clays suitable for the manufacture of the better grades of stoneware and pottery has not, as yet, been definitely determined, although it is quite reasonable to expect that such clays will yet be found, particularly in the western portion of the country.

Prospecting for clays has not yet the same lure as has that for the metals or other mineral products, and the determination of the value of a clay deposit presents, perhaps, a little more difficulty to the prospector than the recognition of some metalliferous ores.

In the United States a great deal of valuable work has been done in connexion with the investigation of the value of clay deposits.

Similar investigations of Canadian clay resources were initiated by the Mines Branch in 1905, when a report was prepared on the Clay Resources of Manitoba. This work has been continued by the Geological Survey Branch; Dr. Heinrich Ries having spent the season of 1908 in the Maritime Provinces, and the summer of 1909 in Alberta.

Although a complete report of the laboratory experiments on the Nova Scotia clays has not yet been made, the results of the field investigation are of sufficient interest to justify the following extracts from Dr. Ries' preliminary report.[1] "The object of the study was to ascertain as far as possible, what geological formations were clay and shale-bearing, and which of these deposits were adapted to the manufacture of clay products. * * * * *

[1]Summary Report, Geological Survey Branch, Department of Mines, 1909, p. 240.

Important Clay-bearing Formations.

"From what has been said above, it will be seen that the formations likely to yield clay or shale deposit of value must be the lower Carboniferous, Millstone Grit, Coal Measures, and Pleistocene. These are few in number, but nevertheless they underlie areas of considerable size.

"*Lower Carboniferous.*—Underlying, as they do, a rather extensive area in central Nova Scotia, and another one in Cape Breton, it is to be regretted that the lower Carboniferous rocks have not been more widely looked into by clay-product manufacturers. The formation is, however, somewhat variable in its character, carrying, as it does, beds of shale, conglomerate, gypsum, and limestone. Those shales closely associated with the gypsum beds may be of value for common brick manufacture, although they frequently contain considerable quantities of impurities, such as gypsum nodules, concretions of iron carbonate, or sandy streaks. At some points though, as near Pugwash, the shale occurs in large beds, and works up well to a plastic mass: the more so as it is slightly weathered. At that locality it supports one of the most active and best equipped brick plants in the Province.

"Northeast of Shubenacadie, also, promising shales were found in the lower Carboniferous, while in the so-called limestone series around Sydney there were found a number of beds which appear promising for brick manufacture, provided the sandstone layers do not occur too thickly.

"*Millstone Grit.*—This is well exposed in the area north of the Coal Measures in the Joggins district; north of the Pictou Coal Measures; south and southeast of Hawkesbury; and west and southwest of the Sydney coal field.

"One cannot predict the universal distribution of promising clay or shale beds in the Millstone Grit, but small beds are not uncommon. Unfortunately, outcrops are scarce in many of the areas underlain by the rocks of this age, which increased the difficulty of finding clays or shales in it. Several deposits of fair importance were seen, and may be referred to in passing. In the Sydney region, a pit has been opened near the Steel works, exposing a bed of soft bluish shale, not less than 5 feet in thickness. A second deposit occurs near the coke oven plant of the Dominion Iron and Steel Company, and a third one outcrops along the east shore of Sydney harbour, near Victoria Mines post-office. Although the tests of these have not yet been completed, it is highly probable that they represent a grade of material considerably higher than brick clay.

"In the Pictou coal region, a rather heavy bed of mottled, shaly clay has been found northeast of Woodbourne station, on the Intercolonial railway. Preliminary tests have shown its adaptability to the manufacture of pressed brick. It may be said here, that there is some doubt as to whether this bed lies in the Millstone Grit or Permian conglomerate, but the former view seems the more reasonable.

"The Millstone Grit contains at least one shale bed of some thickness in the Joggins area; but it is probably of red burning character.

"*Coal Measures.*—These represent the most important clay and shale-bearing formations of Nova Scotia, and were carefully examined in the several areas in which they occur. The largest is the Sydney field, of Cape Breton, and extends from the Big Bras d'Or channel to Cow bay, with only one important interruption, at Cape Percy on the northeastern shore of Cow bay, where the Millstone Grit cuts out the Coal Measures.

"Owing to the almost uninterrupted line of cliffs which fringe the shore-line, a fine series of exposures was obtained. The Sydney coal field is cut into several parts by somewhat deep northeast-southwest bays; which has rendered it difficult for geologists to correlate the sections of the several subdivisions of the field. It can be said that the coal seams are interstratified with a series of shales and sandstones. These are bent into a number of gentle folds, forming the bottom of a broad trough which dips out under the sea. Throughout the field, therefore, low dips prevail. This gives the beds broad outcrops, but still the dip is sufficient to carry the bed rapidly under cover. Toward the northwestern and southeastern parts of the field the sandstone beds predominate, and the shales are of poorer quality, but in the central portion the shales are as abundant as the sandstones. The shales themselves range from smooth, fine-grained, plastic ones, of grey or red colour, to others which are quite siliceous in their character, and of doubtful value. One important deposit is found underlying a large portion of Cranberry head, near Sydney Mines. It is a smooth, greyish shale, and may prove of value for vitrified wares. In the final report it will probably be referred to as the Cranberry Head type, as it appears at a number of points. A second type found at a number of localities in the Nova Scotia Coal Measures is a somewhat soft, reddish shale, well exposed along the shore just west of Cranberry head. Not a few of the shale beds are rather siliceous in appearance and touch, and it would be unwise to express any definite opinion on them until the tests have been completed.

"It seems curious that up to the present time these shales have been completely overlooked; and while it is true that they do not occur in deposits of great thickness, still they are easily accessible, and are capable of supplying a considerable quantity of raw material.

"Numerous references to fireclays in the Sydney field have been published; but as far as we were able to ascertain, this region does not contain any high grade fireclays, although some of them may prove to be low grade. Unfortunately most coal miners have formed the habit of calling any 'under clay' a fireclay.

"*Pictou Field.*—In this field there are numerous shale beds associated with the coal seams, but they are best developed in the central portion of the area, and the most important known up to the present time are higher up in the section than the coal beds. Many of these shales when ground and mixed with water are of strong plasticity, but they unfortunately contain such a high percentage of carbonaceous matter as to require great care in burning, and some of the shale beds are too high in carbonaceous or petroliferous matter to be used at all; while others

have to be avoided on account of the abundant siderite concretions; but in spite of these disadvantages, the field is an important holder of commercially valuable shale deposits. In some parts of the section, as along Coal creek, south of the Allan shaft at Stellarton, the beds of shale are occasionally quite free from carbonaceous material. In only one instance is an under clay worked, viz., at the Drummond colliery at Westville, where a hard shale is mined for the manufacture of bricks. The most important utilization of the shales is near New Glasgow, where they are made into common and pressed brick, flue linings, sewerpipe, and drain tile. Pleistocene drift clay is sometimes added to the pipe mixture.

"*Inverness Field.*—This small field carries a number of shale beds associated with the coals, but few of them are of great thickness; indeed, none of them are equal in volume to those worked in the Pictou area. A good bed outcrops on the shore a few hundred feet south of the dock, and a plastic shale is said to underlie the 7 ft. coal. Most important, however, is the bed of grey, plastic clay which overlies the 13 ft. seam, and is found at several points where that seam is cut through by streams. It is, probably, a No. 2 fireclay, and varies in thickness from 18 inches to 3 feet. If the tests prove it to be of refractory character, it would be practicable to work it in connexion with the coal.

"*Port Hood Field.*—Here, too, there are scattered shale occurrences in both the Millstone Grit and Coal Measures; but the most important is along the shore a short distance north of Judique harbour, where a bluish-grey shale, with a vertical dip, and about 8 to 10 feet thick, outcrops for some distance along the shore.

"*Joggins Area.*—This field contains a number of thin shale seams interstratified with sandstone in the Coal Measure rocks, but few of them are of any thickness. The most important, perhaps, is south of McIntyre brook; while a second one, of possible value, underlies the coal seam at Joggins.

"*Pleistocene Clays.*—These may be roughly divided into two classes: (1) glacial clays, usually of stony character, but very plastic, tough, and red burning; and (2) marine clays, often strongly laminated, but also quite plastic and red burning. These two types of clay are rarely used for anything but drain tile and common brick. A few pressed brick are made from them, and the smoother ones could be utilized for the manufacture of common ornamental terra-cotta and cheap art pottery. The marine clays are best developed in the Annapolis and Shubenacadie valleys, while the stony, glacial clays are worked mainly in the Cape Breton region.

"A most remarkable clay, and one of undetermined age, is that found at Shubenacadie and in the Musquodoboit valley. The material is a highly plastic clay, of dark grey, white, or mottled red and white colour, lying beneath the glacial drift, and resting, possibly, on bed-rock. Its thickness, as indicated by a series of borings made by Mr. Keele, ranges from 7 to probably 50 feet. Scat-

tered lumps of lignite were found in the clay at Shubenacadie, and it is hoped that the age of these can be determined.

"It is exceedingly difficult to determine the exact area underlain by this deposit, owing to the heavy mantle of glacial drift covering the region; but the fact that the material is found at several points extending over a distance of 7 miles, indicates its probable extent, unless some of the masses have been pushed along with the drift. Borings could, of course, only be made at those points where the drift cover was thin or absent.

"The clay burns to a cream colour, and fairly dense body at a comparatively low temperature. It is at least semi-refractory in its character, and may prove to be a stoneware clay. Some test bricks were made from a carload lot of this clay, taken from a shaft sunk in the deposit at Shubenacadie.

"It is safe to say that nothing like it has been found elsewhere in Nova Scotia, and its resemblance to some of the Cretaceous fireclays of New Jersey is striking.

New Brunswick.

"As most of our time was required for the examination of the Nova Scotia clays, but little of the field season was left for New Brunswick. Several localities were examined, and the following is a condensed statement of the results.

"In the vicinity of Albert Mines, in Albert county, there are some very promising beds of Devonian shales, which are probably of red burning character. In the event of the oil-shales at that locality being developed, these shales will be of importance for brick manufacture, but aside from this, they may prove to be of value for making pressed brick to be shipped to other markets. Nearby there are also red burning shales of lower Carboniferous age. Some of the latter are located along the line of the railway.

"Many shale deposits, some of which may prove to be of refractory character, are associated with the coal deposits around Minto and Chapman, northeast of Grand lake. Similar shales underlie and overlie the coal 12 miles southeast of Harcourt.

"Marine clays are worked for common, and some pressed brick, at both St. John and Fredericton.

Prince Edward Island.

"The only clay resources of Prince Edward Island are of Pleistocene age. Common brick clays are found at a number of points, but are worked to only a slight extent.

Clay Working Industry.

"Up to the present time, the clay deposits of Nova Scotia have been but little developed. Common brick are made at Annapolis, Middleton, and Avonport, in the Annapolis Valley region, and at Shubenacadie, and Elmsdale in the Shubenacadie valley. Other yards are in operation at Sylvester, New Glasgow, Pugwash, Eden Siding, and Mira River. In most cases these are operated to supply a rather local demand, although the Annapolis and Pugwash brick are sometimes

shipped some distance by water. Common pottery is made from the smoother sections of the surface clays south of Elmsdale. Most of the common brick-yards re-press a few brick. A hard brick, known in the trade as a firebrick, but not really such, is made from the Carboniferous shales at Westville. Sewerpipe, flue linings, and drain tile are made from the shales at New Glasgow; and some drain tile are manufactured in the Annapolis valley by the same firms that produce brick.

"It will be seen, therefore, that there is considerable room for expansion. If such development occurs, the markets will be mainly outside of the Province, except for common brick. At present the buildings in that region are constructed mainly of wood; but as the supply of this becomes scarcer and more expensive, brick must be utilized as a substitute. For outside markets, the plants should be located as near to water as possible, to avoid rail shipment.

"It is hoped that the studies of the samples now being carried on will demonstrate the value of the clay and shales for making pressed brick, vitrified brick, earthenware, and perhaps stoneware, sewerpipe, etc."

LIME.

The activity of building operations in 1909 is reflected also in the statistics of lime production for that year. The total sales were reported as 5,592,924 bushels, valued at $1,132,756, or an average of 20 cents per bushel; as compared with 3,601,468 bushels, valued at $712,947, or an average of 20 cents per bushel in 1908. The returns of production for 1909, particularly for the Provinces of New Brunswick and Manitoba, were probably a little more complete than those for 1908, so that the actual increase may not be quite so large as is indicated in the above figures.

The production or sales by provinces during the past four years is shown in the tables following. A small quantity of lime is usually made in Prince Edward Island, but mostly from stone brought over from Nova Scotia, and the figures have been included in the statistics for this Province.

Lime Production by Provinces, 1906 and 1907.

Province.	1906.				1907.			
	Bushels.	Value.	Average per Bushel.	%	Bushels.	Value.	Average per Bushel.	%
		$	cts.			$	cts.	
Nova Scotia	50,000	13,600	27	2·3	45,000	16,000	35	1·6
New Brunswick	405,450	94,290	23	9·3	554,330	124,786	23	12·8
Quebec	923,563	201,816	22	20·0	1,053,856	262,990	25	27·0
Ontario	2,885,000	496,785	17	49·2	2,333,879	393,474	17	40·4
Manitoba	620,201	119,792	19	11·9	431,548	84,793	20	8·7
Saskatchewan	.....	.....	.....	.....	3,700	1,480	40	0·2
Alberta	240,000	56,200	23	5·6	173,040	41,225	24	4·2
British Columbia	106,192	26,694	25	2·7	159,963	49,847	31	5·1
	5,230,406	1,009,177	19	100·0	4,755,316	974,595	20	100·0

Lime Production by Provinces, 1908 and 1909.

Province.	1908.				1909.			
	Bushels.	Value.	Average per Bushel.	%	Bushels.	Value.	Average per Bushel.	%
		$	cts.			$	cts.	
Nova Scotia	51,068	16,102	32	2·3	57,730	16,729	29	1·5
New Brunswick	155,748	34,262	22	4·8	697,466	154,151	22	13·6
Quebec	857,700	201,357	23	28·2	1,281,827	315,633	25	27·9
Ontario	2,087,731	358,507	17	50·3	2,619,553	434,147	17	38·3
Manitoba	133,786	24,192	17	3·4	423,954	69,670	16	6·2
Alberta	135,000	34,500	26	4·8	281,125	67,350	24	5·9
British Columbia	176,435	44,027	25	6·2	231,269	75,076	32	6·6
	3,601,468	712,947	20	100·0	5,592,924	1,132,756	20	100·0

As with the other structural materials, Ontario is the largest producer, this Province being credited with 38 per cent of the total value during 1909.

Quebec province has also a very considerable lime production, contributing about 28 per cent of the total value; and next to these in importance comes New Brunswick. The average price per bushel in the several provinces ranged from 16 cents in Manitoba to 32 cents in British Columbia. The average price per bushel in Ontario has remained constant during the past four years at 17 cents. Statistics of the annual production of lime in Ontario as published by the Ontario Bureau of Mines are available since 1896, and are shown in the next table. These returns are slightly higher than those obtained by the Mines Branch.

Annual Production of Lime in Ontario.

(As ascertained by the Ontario Bureau of Mines).

Calendar Year.	Bushels.	Value.	Cents. per Bushel.	Calendar Year.	Bushels.	Value.	Cents per Bushel.
		$				$	
1896	1,880,000	222,000	12	1903	3,400,000	520,000	15
1897				1904	2,600,000	406,800	16
1898	2,620,000	308,000	12	1905	3,100,000	424,700	14
1899	4,342,500	535,000	12	1906	2,885,000	496,785	17
1900	3,893,000	544,000	14	1907	2,650,000	418,700	17
1901	4,100,000	550,000	13	1908	2,442,331	448,596	18
1902	4,300,000	617,000	14	1909	2,633,500	470,858	18

Exports and Imports.—The value of the lime exported during the calendar year 1909 was $48,821, the destination of shipments being mainly the United States.

The imports during the same period were 168,357 barrels valued at $118,239, and were derived chiefly from the United States.

Annual statistics of exports and imports are given in the next two tables :—

Exports of Lime.

Calendar Year.	Value.	Calendar Year.	Value.	Calendar Year.	Value.
	$		$		$
1891	119,853	1898	49,594	1905	85,723
1892	121,535	1899	73,565	1906	57,072
1893	86,623	1900	80,852	1907	55,903
1894	83,670	1901	99,194	1908	43,316
1895	71,697	1902	116,009	1909	48,821
1896	70,820	1903	131,412		
1897	53,177	1904	73,838		

Imports of Lime.

Fiscal Year.	Barrels.	Value.	Fiscal Year.	Barrels.	Value.
		$			$
1880	6,100	6,013	1895	12,008	5,743
1881	5,796	4,177	1896	10,239	7,331
1882	5,064	5,365	1897	16,108	10,529
1883	7,623	9,224	1898	12,850	9,002
1884	10,804	11,200	1899	15,720	11,124
1885	12,072	11,503	1900	12,865	11,211
1886	11,021	9,347	1901	19,657	14,534
1887	10,835	8,524	1902	24,602	17,584
1888	10,142	7,537	1903	31,108	22,470
1889	13,079	9,363	1904	54,359	39,639
1890	8,149	5,360	1905	98,676	71,588
1891	6,259	4,273	1906	134,334	93,630
1892	6,132	4,241	1907 (9 mos.)	88,919	67,573
1893	6,879	4,917	1908	129,379	99,611
1894	6,766	4,907	1909. Duty 20 per cent	153,934	106,263

SAND-LIME BRICK.

For the year 1909 returns were received from nine manufacturers of sand-lime brick, showing total sales to have been 27,052,864, valued at $201,650, or an average of $7.45 per thousand.

Annual statistics of production since 1907 are shown below :—

Annual Production of Sand-Lime Brick.

Calendar Year.	Number.	Value.
		$
1907	16,492,971	167,795
1908	17,288,260	152,856
1909	27,052,864	201,650

The following is a list of manufacturers of sand-lime brick whose returns of production were received :—

The Schultz Bros. Co., Ltd., Brantford, Ont.
Jno. Mann & Sons, Brantford, Ont.
The Silicate Brick Co. of Ottawa, Ltd., Ottawa, Ont.
The Peterboro Sandstone Brick Co., Ltd., Peterborough, Ont.
Toronto Indestructible Brick Co., Ltd., Toronto, Ont.
The Brandon Brick & Lumber Co., Brandon, Man.
Manitoba Pressed Brick Co., Ltd., Winnipeg, Man.
Interocean Pressed Brick Co., Regina, Sask.
The Silicate Brick & Lime Co. of Victoria, Victoria, B.C.

SANDS AND GRAVELS.

No statistics are available as to the production of sand and gravel, but the trade returns of the Customs Department show an export and an import of these materials for a number of years, of which a record is given in the accompanying tables :—

Annual Exports of Sand and Gravel.

Calendar Year.	Tons.	Value.	Calendar Year.	Tons.	Value.
		$			$
1893	329,116	121,795	1902	159,793	119,120
1894	324,656	86,940	1903	355,792	124,006
1895	277,162	118,359	1904	399,809	129,803
1896	224,769	80,110	1905	306,935	152,805
1897	152,963	76,729	1906	336,550	139,712
1898	165,954	90,498	1907	298,095	119,853
1899	242,450	101,640	1908	298,954	161,387
1900	197,558	101,666	1909	481,584	256,166
1901	197,302	117,465			

Annual Imports of Sand and Gravel.

Fiscal Year.	Tons.	Value.	Fiscal Year.	Tons.	Value.
		$			$
1893	26,065	31,739	1902	47,381	58,668
1894	41,573	33,506	1903	91,518	95,647
1895	19,609	24,779	1904	110,634	107,547
1896	18,953	24,604	1905	85,339	92,722
1897	21,308	25,222	1906	116,500	173,727
1898	32,148	43,287	1907 (9 mos.)	171,700	177,412
1899	30,288	42,209	1908	266,704	223,043
1900	35,713	41,280	1909	132,158	136,011
1901	35,749	42,891			

SLATE.

The production of slate continues much the same as in previous years. No new quarries have been opened up, and the output was obtained entirely from the New Rockland slate quarries of Richmond county, Quebec, which have for a number of years been operated under lease by Messrs. Fraser and Davies.

The production for 1909 was reported as 4,000 squares, valued at $19,000; as compared with a production valued at $13,496 in 1908, and $20,056 in 1907.

A small export of slate to the value of $612 was reported in 1909.

Statistics of annual production since 1886 are shown herewith :—

Annual Production of Slate.

Calendar Year.	Tons.	Value.	Calendar Year.	Tons.	Value.
		$			$
1886	5,345	64,675	1898		40,791
1887	7,357	89,000	1899		33,406
1888	5,314	90,689	1900		12,100
1889	6,935	119,160	1901		9,980
1890	6,368	100,250	1902		19,200
1891	5,000	65,000	1903	5,510	22,040
1892	5,180	69,070	1904	5,277	23,247
1893	7,112	90,825	1905		21,568
1894		75,550	1906		24,446
1895		52,900	1907	4,335	20,056
1896		53,370	1908	2,950	13,496
1897		42,800	1909	4,000	19,000

That there is a more extensive market in Canada than is supplied by slate from Canadian sources is shown by the following statistics of imports :—

The total value of the imports of slate in 1909 was $135,221, of which $71,914 was roofing slate, and $34,085 school writing slates. The imports of roofing slate, school writing slates, and manufacture of slate n. o. p, are chiefly from the United States. Some roofing slate is also imported from Great Britain, while slate pencils principally come from Germany and the United States.

Statistics of imports and exports are shown in the following table :—

Imports of Slate during the Years 1908 and 1909.

Slate and Manufactures of.	12 months ending March, 1908.	12 months ending March, 1909.	12 months ending Dec., 1909.
	$	$	$
Mantles		90	
Roofing slate	72,588	62,132	71,914
School writing slate	26,834	29,340	34,085
Slate pencils	3,398	4,379	6,154
Slate of all kinds and manufactures of	27,749	28,124	23,068
	131,069	124,065	135,221

Exports of Slate.

Calendar Year.	Tons.	Value.	Calendar Year.	Tons.	Value.
		$			$
1884	539	6,845	1892	87	2,038
1885	346	5,274	1893	178	3,168
1886	34	495	1894	187	3,610
1887	27	373	1895	36	574
1888	22	475	1896	301	8,913
1889	26	3,303	1897 to 1907	Nil.	Nil.
1890	12	153	1908		2,539
1891	15	195	1909	134	612

Imports of Slate.

Fiscal Year.	Value.	Fiscal Year.	Value.	Fiscal Year.	Value.
	$		$		$
1880	21,431	1890	22,871	1900	53,707
1881	22,184	1891	46,104	1901	72,187
1882	24,543	1892	50,441	1902	72,601
1883	24,968	1893	51,179	1903	84,437
1884	28,816	1894	29,267	1904	86,057
1885	28,169	1895	19,471	1905	93,228
1886	27,852	1896	24,176	1906	112,941
1887	27,845	1897	21,615	1907 (9 mos)	95,520
1888	23,151	1898	24,907	1908	131,069
1889	41,370	1899	33,100	1909	118,900

STONE.

Statistics of stone production given herewith, include the sales of all classes of stone used for building, monumental and ornamental purposes, stone for paving purposes, curbstone and flagstone, rubble, rip-rap and crushed stone, limestone for furnace flux, sugar factories, etc.; but stone used for burning lime or the manufacture of cement, is not included.

The kinds of stone quarried have been classed as granite, limestone, sandstone, and marble.

The records are practically confined to quarry operations or the production of sawn or polished stone when these operations are carried on by the quarry operators. In addition to this production of stone by regular operators there is no doubt a large stone production by individuals such as farmers and others, for house or barn foundations, concrete work, etc., of which it would be impracticable to obtain any satisfactory record. Much stone is probably also used in railway construction work and in road building, of which no record has yet been obtained.

The statistics obtained for 1909 are much more complete than those for former years, and for that reason it is somewhat difficult to make comparisons.

It is impossible also, except in a few cases, to show the quantity of stone production, so that the value only of the shipment can be given.

The total value of the stone production in 1909 was returned as $3,127,135. In 1908, the total value, not including limestone for flux, was estimated at $2,088,613, or, including the stone used for flux, $2,378,318. In 1909 the total number of men reported employed in connexion with stone quarrying was 4,843, and the wages paid $2,111,987.

Of the total value of the 1909 production, limestone contributed 68·4 per cent or $2,139,691 in value; granite, 14·5 per cent or $454,824; sandstone, 12 per cent or $374,179; and marble, 5·1 per cent or $158,441.

Stone was used for building purposes to the value of $1,170,550 or 37·4 per cent of the total; monumental and ornamental stone a value of $306,338 or 9·8 per cent; curb, paving, and flagstone, $279,227 or 8·9 per cent; rubble $303,120 or 9·7 per cent; crushed stone $664,287 or 21·3 per cent, and furnace flux $403,613 or 12·9 of the total.

By provinces, Quebec shows the largest output, having a value of $1,359,349 or 43·5 per cent; the total being made up of limestone to the value of $972,253, granite valued at $257,096, and marble valued at $130,000. Ontario takes second place with a production of $748,639 in value or 23·9 per cent of the total: of which limestone is credited with $639,674; sandstone, $62,824; granite, $42,700; and marble, $3,441. The total production in British Columbia was $365,081: including granite to the value of $134,310; sandstone, $168,553; limestone, $37,258; and marble, $25,000. The production in Manitoba was valued at $331,899: made up of limestone $328,554, and granite $3,345. The Nova Scotia production was reported as $189,604: comprising limestone, $161,922; sandstone, $21,850, and granite, $5,832. New Brunswick is credited with $42,180: made up chiefly of sandstone and granite. Alberta reported a production of $90,383, all of sandstone.

Production of Stone by Provinces, 1909.

Province.	Granite.	Limestone.	Marble.	Sandstone.	Total.	%
	$	$	$	$	$	
Nova Scotia	5,832	161,922	.....	21,850	189,504	6·1
New Brunswick	11,541	30	.....	30,609	42,180	1·3
Quebec	257,096	972,253	130,000	.....	1,359,349	43·5
Ontario	42,700	639,674	3,441	62,824	748,639	23·9
Manitoba	3,345	328,554	.....	.....	331,899	10·6
Alberta	.....	.....	.....	90,383	90,383	2·9
British Columbia	134,310	37,258	25,000	168,513	365,081	11·7
Totals	454,824	2,139,691	158,441	374,179	3,127,135	100
Per cent	14·5	68·4	5·1	12·0	100	

Value of Stone sold for various purposes in 1909.

Kind.	Building.	Ornamental and Monumental.	Paving and Curbstone.	Rubble.	Crushed.	Furnace Flux.	Total.
	$	$	$	$	$	$	$
Granite	159,470	73,611	106,963	63,205	51,575	.....	454,824
Limestone	666,324	95,457	154,490	210,418	609,349	403,613	2,139,691
Marble	20,000	135,780	.....	2,661	.....	.....	158,441
Sandstone	324,716	1,490	17,774	26,836	3,363	.....	374,179
Totals	1,170,550	306,338	279,227	303,120	664,287	403,613	3,127,135

Exports and Imports.—The exports of stone are classified simply as wrought and unwrought; the total value of the exports in 1909 was $59,370, as compared with $58,005 in 1908.

The annual exports given since 1890 are shown in the following table:—

Exports of Stone and Marble, Wrought and Unwrought.

Calendar Year.	Wrought.	Unwrought.	Calendar Year.	Wrought.	Unwrought.
	$	$		$	$
1890	21,725	43,611	1900	5,933	115,711
1891	13,398	46,162	1901	5,917	157,739
1892	7,698	47,424	1902	8,632	124,829
1893	9,102	12,532	1903	7,684	46,295
1894	22,576	34,130	1904	4,760	17,802
1895	8,587	51,616	1905	3,545	13,089
1896	4,934	32,397	1906	23,097	4,675
1897	9,415	42,034	1907	4,233	3,087
1898	2,526	65,370	1908	15,194	42,811
1899	5,092	101,931	1909	33,598	25,772

The imports are classified as building stone of all kinds except marble, manufactures of granite and other stone, and marble and its manufactures. The total value of the imports of stone during the calendar year 1909 was $683,801, the imports during the fiscal year ending March were $531,822; as compared with a value of $651,525 during the fiscal year 1908.

Of the imports during the calendar year 1909, $280,557 in value was classed as building stone; $132,298 as granite, sawn and manufactures of; $58,355 as paving blocks, and $182,147 as marble and manufactures of. Details of the imports of the calendar year 1909 and the fiscal years 1908 and 1909, and of the annual imports since 1880, are shown in accompanying tables.

The imports during 1909 were derived chiefly from the United States and Great Britain; the United States supplying building stone, paving blocks, and marble principally. The imports from Great Britain consisted mainly of manufactures of granite. Marble is obtained in some quantity from Italy also.

Total Imports of Stone during the Calendar Year 1909.

Imports.	Tons.	Value.
		$
Building stone, rough (1)	21,746	102,470
" dressed (2)	35,910	178,087
Granite, sawn only	307	2,380
" mfgs. of		129,918
Paving blocks		58,355
Manufactures of stone, N.O.P.		30,444
Marble and mfgs. of—		
Marble, sawn only		118,095
" rough, not hammered or chiselled		8,414
" manufactures of, N.O.P.		55,638
		683,801

(1) Flagstones, granite, rough freestone, sandstone, and all building stone not hammered or chiselled.

(2) Flagstone and all other building stone, sawn or dressed.

Imports of Stone, showing Country of Origin, Calendar Year 1909.

Imports of.	Great Britain.		United States.		Italy.	Other Countries.
	Tons.	Value.	Tons.	Value.	Value.	Value.
		$		$	$	$
Building stone, rough (1)	506	2,048	21,115	99,933		489
" dressed (2)	144	987	35,766	177,100		
Granite, sawn only	120	802	187	1,578		
" mfgs. of		121,983		7,921		14
Paving blocks				58,355		
Manufactures of stone, N.O.P.		3,374		24,316		2,754
Marble and mfgs. of—						
Marble, sawn only		2,275		85,656	29,071	1,093
" rough, not hammered or chiselled				8,414		
" manufactures of, N.O.P.		1,393		53,092		1,153
		132,862		516,365	29,071	5,503

(1) Flagstones, granite, rough freestone, sandstone, and all building stone not hammered or chiselled.

(2) Flagstone and all other building stone, sawn or dressed.

Imports of Stone, Fiscal Years 1908 and 1909.

Imports.	1908.		1909.	
	Tons.	Value.	Tons.	Value.
		$		$
Building stone, rough (1)	19,344	80,950	14,011	63,984
" dressed (2)	17,166	90,740	16,841	72,961
Granite, sawn only	1,019	5,450	302	2,756
" mfgs. of		119,381		123,155
Paving blocks		32,566		42,420
Manufactures of stone, N.O.P.		34,851		25,618
Marble and mfgs. of—				
Marble, sawn only		155,668		108,522
" rough, not hammered or chiselled.		5,319		9,138
" manufactures of, N.O.P		126,600		63,268
		651,525		831,822

(1) Flagstones, granite, rough freestone, sandstone, and all building stone not hammered or chiselled.

(2) Flagstone and all other building stone, sawn or dressed.

Annual Imports of Stone.

Fiscal Year.	Building Stone.		Manufactures of Granite, etc,	Marble.	Flagstones.	Total Value.
	Rough.	Dressed.				
	$	$	$	$	$	$
1880	32,824	3,146	29,408	63,015		128,393
1881	7,823	50,326	36,877	85,977	241	181,244
1882	32,848	775	37,267	109,505	848	181,243
1883	33,429	1,632	45,636	128,520	99	209,316
1884	46,232	4,856	45,290	108,771	1,158	206,307
1885	28,433	2,058	39,867	102,835	1,756	174,949
1886	36,776	4,899	41,984	117,752	9,443	210,854
1887	47,819	6,549	41,829	104,250	10,966	211,413
1888	84,263	2,110	47,487	94,681	21,077	249,618
1889	89,723	10,591	61,341	118,421	15,451	295,527
1890	126,456	5,699	84,396	99,353	48,995	364,899
1891	151,119	19,771	61,051	107,661	36,348	372,950
1892	85,169	10,381	39,479	106,268	15,048	256,345
1893	47,609	8,901	49,323	96,177	8,500	210,510
1894	48,097	4,811	49,510	94,657	2,429	199,504
1895	37,732	6,550	51,050	83,422	84	178,838
1896	42,737	11,393	51,499	90,065	Nil	195,694
1897	27,442	11,272	34,026	77,150	227	150,117
1898	25,322	3,173	41,240	95,894	1,540	167,129
1899	43,494	4,546	60,148	104,879	Nil	210,067
1900	63,376	1,157	57,039	94,017	63	215,652
1901	45,039	1,039	66,639	96,159	116	208,992
1902	69,972	29,102	72,397	130,424	1,231	303,126
1903	71,202	16,664	78,629	153,481	Nil	319,976
1904	59,864	33,914	141,165	181,511	Nil	416,454
1905	49,004	53,813	150,160	145,466	Nil	398,443
1906	66,994	65,134	178,435	189,589	Nil	500,152
1907	58,398	78,967	136,779	176,450	Nil	450,594
1908	80,950	90,740	192,248	287,587	Nil	651,525
1909	63,984	72,961	193,949	200,928	Nil	531,822

GRANITE.

Granite is produced largely for building, monumental, and paving purpose and the main centres of production for 1909 were in Quebec and British Columbia, although Ontario and New Brunswick are also important producers.

The total value of the production in 1909 was $454,824, as compared with as production in 1908 of $282,320, and in 1907 of $194,712.

Statistics of the production by provinces, showing the purpose for which the stone was sold, and the annual total production since 1886, are shown in the following tables.

Value of Granite Production by Provinces, 1909.

Province.	Building.	Monumental or Ornamental.	Curb, or Paving.	Rubble.	Crushed.	Total.
	$	$	$	$	$	$
Nova Scotia	458	2,528	2,846			5,832
New Brunswick	3,378	7,038	450	675		11,541
Quebec	139,634	58,845	56,167	20	2,430	257,096
Ontario		2,700	36,500		3,500	42,700
Manitoba					3,345	3,345
British Columbia	16,000	2,500	11,000	62,510	44,300	134,310
Total	159,470	73,611	106,963	63,205	51,575	454,824

Annual Production of Granite.

Calendar Year.	Tons.	Value.	Calendar Year.	Tons.	Value.
		$			$
1886	6,062	63,309	1898	23,897	81,073
1887	21,217	142,506	1899	13,418	90,542
1888	21,352	147,305	1900		80,000
1889	10,197	79,624	1901		155,000
1890	13,307	65,985	1902		210,000
1891	13,637	70,056	1903		200,000
1892	24,302	89,326	1904		150,000
1893	22,521	94,393	1905		226,305
1894	16,392	109,936	1906		278,419
1895	19,238	84,838	1907	15,136	194,712
1896	18,717	106,709	1908		282,320
1897	19,345	61,934	1909		454,824

LIMESTONE.

No record has been obtained of the stone used for burning for lime or for making cement, the value of these manufactured products being separately tabulated. With these exceptions then, the total production of limestone in Canada in 1909 was valued at $2,139,691, of which, stone to the value of $761,821 was used for

building and ornamental purposes. The value of crushed stone sold was $609,349; curbstone and paving stone, $154,490; rubble, $210,418. For use as a furnace flux there was sold 842,232 tons valued at $403,613.

There is no separate record of the production of limestone in 1908 or previous years.

Value of Limestone Production by Provinces, 1909.

Province.	Building and Ornamental.	Crushed.	Curbstone and Paving.	Rubble.	Furnace Flux.		Total.
	$	$	$	$	Tons.	$	$
Nova Scotia	2,025	.....	.....	.....	319,795	159,897	161,922
New Brunswick	30	.....	.....	.....	.....	.....	30
Quebec	456,338	257,185	154,259	94,221	20,500	10,250	972,253
Ontario	78,823	297,589	169	66,885	427,422	196,208	639,674
Manitoba	224,605	54,575	62	49,312	.....	.....	328,554
British Columbia	.....	.....	.....	.....	74,515	37,258	37,258
Total	761,821	609,349	154,490	210,418	842,232	403,613	2,139,691

Nova Scotia.—The value of the limestone quarried in this Province in 1909 was returned as $161,922, of which the greater part was quarried at Marble Mountain and Point Edward, C.B., and used in the blast furnaces and steel plants of the Province.

Quebec.—The value of the limestone produced in 1909 was $972,253, of which about 80 per cent was quarried on the Island of Montreal. There is also an important production in Portneuf county and in the City of Hull, in Ottawa county; smaller operations being carried on in the counties of Vercheres, St. Johns, and Terrebonne.

About 46·9 per cent of the production was returned as for building purposes, etc.; 15·8 per cent for curbstone and paving; 9·7 per cent for rubble stone; and 26·5 per cent for crushed stone, and a small quantity used as furnace flux.

Ontario.—The production of limestone in Ontario, according to returns received, was valued at $639,674.[1] This figure is, however, an underestimate, owing to the non-receipt of returns from a number of known producers. Crushed stone was valued at $297,589; rubble at $66,885; building and ornamental stone, $78,823. There was also produced 427,422 tons of stone valued at $196,208, and sold for furnace flux.

The largest operated quarries are found in the counties lying about the western end of Lake Ontario, including Halton, Wentworth, Lincoln, Welland, and Haldimand.

Manitoba.—Limestone quarries are operated in the vicinity of Tyndall, thirty miles northeast of Winnipeg, and at Stony Mountain, Stonewall, Rockspur, and

[1] Additional returns received since completing the statistics have increased the total to $694,674, the increase being crushed stone and rubble.

Gunton on the Canadian Pacific railway, Teulon Branch, from twelve to twenty-five miles north of Winnipeg.

British Columbia.—The Consolidated Mining and Smelting Company, operate a quarry at Fife on the Canadian Pacific railway, Boundary division, to supply flux for the Trail smelter.

MARBLE.

The value of the marble production in 1909 has been returned as $158,441. Complete statistics of the 1908 production were not received, but the total value of the finished stone produced was estimated at not less than $125,000. Marble quarries were operated at Philipsburg, Que.; at Tatlock, in Lanark county, and in Hungerford township, Hastings county, Ontario; and near Lardo, head of Kootenay lake, British Columbia.

The value of the Quebec production was $130,000; Ontario $3,441, and British Columbia, $25,000. With the exception of a small quantity used as crushed marble, the entire output was employed for building, ornamental, and decorative purposes. There has been only a spasmodic production of marble in Canada in past years, and from 1897 to 1907 there was no production whatever reported.

Annual Production of Marble.

Calendar Year.	Tons.	Value.	Calendar Year.	Tons.	Value.
		$			$
1886	501	9,900	1893	590	5,100
1887	242	6,224	1894	Nil.	Nil.
1888	191	3,100	1895	200	2,000
1889	83	980	1896	224	2,405
1890	780	10,776	1897 to 1907 inclusive	Nil.	Nil.
1891	240	1,752	1908	....	125,000
1892	340	3,600	1909	.....	158,441

The most successful operations being carried on at present are at the quarries at Philipsburg, Quebec, operated by the Missisquoi Marble Company, Ltd., of Montreal. The quarry is provided with channeling machinery, steam drills, and derricks; while the mill and finishing shops contain gang saws, planer, lathe, polishing machinery, pneumatic tools, etc. The marble is in considerable demand as a decorative stone, and finds a market throughout Canada, from Prince Edward Island to Vancouver, and is also exported to the United States. During 1909 the Company installed additional equipment with the expectation of being able to double their output.

In Ontario the operations were practically in the initial stages of development, and the output consequently small.