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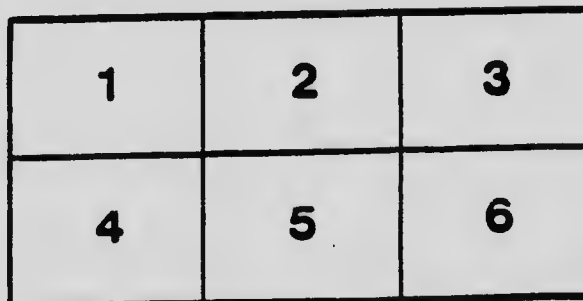
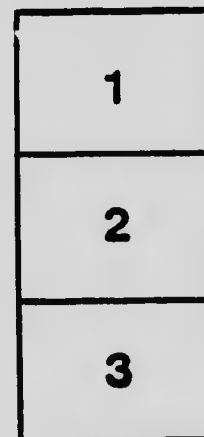
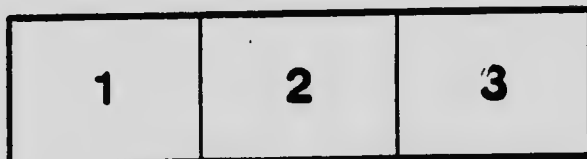
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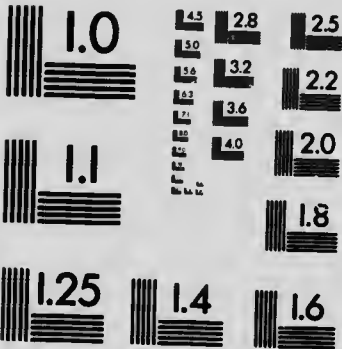
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DEPARTMENT OF MINES
MINES BRANCH

HON. W. TEMPLEMAN, MINISTER; A. P. LOW, LL.D., DEPUTY MINISTER;
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THE
PRODUCTION OF CEMENT, LIME, CLAY PRODUCTS, STONE,
AND OTHER STRUCTURAL MATERIALS
IN
CANADA
During the Calendar Year
1910

JOHN McLEISH, B.A.
Chief of the Division of Mineral Resources and Statistics.



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**ADVANCE CHAPTER OF THE ANNUAL REPORT ON THE MINERAL
PRODUCTION OF CANADA DURING THE CALENDAR YEAR 1910.**

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.

The rapid growth of Canada's population, particularly in the west, and the development of industrial resources throughout the country are naturally accompanied by a greatly increased production of clay products and other structural material such as those enumerated above.

The record shows a total production of these products in 1910 valued at \$19,627,592, as compared with a value of \$16,533,349 in 1909; an increase of \$3,094,243 or 18.72 per cent.

Statistics of building permits issued in twenty-four cities representative of every province of the Dominion show a corresponding growth. The total permits for construction issued in 1910 were \$94,129,423, compared with permits of \$64,509,620 in 1909; an increase of 45.92 per cent.

A summary of the production of structural materials and clay products is shown below:—

	1906.	1907.	1908.	1909.	1910.
	\$	\$	\$	\$	\$
Cement.....	3,170,859	3,781,371	3,709,954	5,345,802	6,412,215
Clay products.....	5,072,635	5,772,117	4,500,702	6,450,840	7,629,956
Lime.....	1,009,177	974,595	712,947	1,132,756	1,137,079
Sand-lime brick.....		167,795	152,856	201,650	371,857
Sand and gravels (exports).....	139,712	119,853	161,387	256,166	407,974
Slate.....	24,446	20,056	13,496	19,000	18,492
Stone.....	2,113,699	2,027,262	2,088,613	3,127,135	3,650,019
Total.....	11,530,528	12,863,049	11,339,955	16,533,349	19,627,592

The increase in the value of cement sales in 1910 over 1909 was 20 per cent; clay products, an increase of 18 per cent; stone, an increase of 17 per cent; sand-lime brick, an increase of 84 per cent. There was only a small increase in the production of lime and about the same production of slate. Complete statistics

of sand and gravel production are not yet collected, the figures given showing only the amounts of these products exported.

In addition to the domestic production of these structural materials there is also a considerable importation into Canada, particularly of the clay products. The imports during 1910 include cement to the value of \$468,046; clay products, \$4,331,397; lime, \$138,847; sand and gravel, \$196,766; slate, \$142,285; stone, \$845,123; or a total import valued at \$6,122,464.

CEMENT.

While the production of cement in Canada in 1910 is all classed as Portland, the output includes Puzzolan cement made at Sydney, N.S., and a "natural Portland" made at Babcock, Manitoba, located 75 miles southwest of Winnipeg on the Canadian Northern railway.

According to returns received from the manufacturers, the total quantity of cement made in Canada during 1910 was 4,396,282 barrels of 350 pounds net, as compared with 4,146,708 barrels in 1909; an increase of 249,574 barrels or 6 per cent.

The total quantity of Canadian Portland cement sold in 1910 was 4,753,975 barrels, as compared with 4,067,709 barrels in 1909; or an increase of 686,266 barrels or 16.9 per cent.

The total consumption of Portland cement in 1910, including Canadian and imported cements, was 5,103,285 barrels (of 350 pounds net), as compared with 4,209,903 barrels in 1909; or an increase of 893,382 barrels, or 21.2 per cent.

Statistics of the total annual sales of natural rock and Portland cement since 1887 are shown in the following table:—

Annual Production of Cement.*

Calendar Year.	Natural Rock Cement.		Portland Cement.		Totals.	
	Barrels.	Value.	Barrels.	Value.	Barrels.	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	255,366	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	98,332	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	2,645,289	3,709,139	2,666,333	3,709,954
1909.....	0	0	4,067,709	5,345,802	4,067,709	5,345,802
1910.....	0	0	4,753,975	6,412,215	4,753,975	6,412,215

*Quantities sold or shipped.

The production of cement in 1910 was derived from 22 operating plants with a total daily capacity of 25,835 barrels, the operating plants being 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 Exshaw plant was not operated during the year nor was the Point Ann plant of the Canada Cement Company, in O . . o.

comparison of the principal cement statistics for 1909 and 1910, giving the increases or decreases, as the case may be, is shown in the next table.

Comparison of Production, Sales, and Imports of Portland Cement in 1909 and 1910.

	1909.	1910.	Increase.	%	Decrease.	%
Cement sold..... Bls.	4,067,709	4,753,975	686,266	16.0		
Cement manufactured..... "	4,146,708	4,396,282	249,574	6.0		
Stock on hand Jan. 1..... "	1,098,239	1,189,731	91,492	8.3		
Stock on hand Dec. 31..... "	1,177,238	832,038			345,200	29.3
Value of cement sold..... \$	5,345,802	6,412,215	1,066,413	20.0		
Average price per barrel..... "	1.31	1.35	0.04	3.1		
Wages paid..... "	1,266,128	1,409,715	143,587	11.3		
Men employed..... No.	2,498	2,220			278	11.1
Imports of Portland cement... Bls.	142,194	349,310	207,116	146.0		
Value of cement..... \$	166,669	468,046	301,377	181.0		
Average price per barrel..... "	1.17	1.34	0.17	14.5		
Total consumption of cement in Canada..... Bls.	4,209,903	5,103,285	893,382	21.2		
No. of completed plants operated....	21	22	1	4.8		
Total daily capacity of operating plants as on Dec. 31..... Bls.	23,050	25,835	2,785	12.1		

It will be observed that there was a falling off in the stock of cement on hand at the end of 1910 as compared with the stock at the end of 1909, also that there was a considerable increase in the imports of cement. The total wages paid show an increase of about 11 per cent although apparently there was at the same time a decrease in the average number of men employed; an increase of 6 per cent only is shown in the quantity of cement made, as compared with an increase of 17 per cent in the sales and an increase of 21 per cent in the consumption. Of the total quantity of cement made in 1910, 1,214,479 barrels were made from marl and 3,181,803 barrels from limestone and slag. In 1909 there were 810,706 barrels made from marl and 3,336,002 barrels made from limestone and slag, and in 1908, 1,573,090 barrels were made from marl and 1,922,871 barrels from limestone and slag.

The detailed production of cement in Ontario during 1909 and 1910 is shown in the next table and the production in all other provinces in the table following:—

Cement Production in Ontario, 1909 and 1910.

		1909.	1910.	Increase.	%	Decrease.	%
Cement sold.....	Bls.	2,462,027	2,504,650	42,623	1.7		
Cement manufactured.....	"	2,283,263	2,496,200	212,937	9.3		
Stock on hand Jan. 1.....	"	765,873	600,971			164,902	21.5
Stock on hand Dec. 31.....	"	587,199	592,521	5,412	0.9		
Value of cement sold.....	\$	3,084,218	3,150,479	66,261	2.2		
Wages paid.....	"	606,639	743,213	136,574	22.5		
Men employed.....	No.	1,340	1,306			34	2.5
Total daily capacity of operating plants.....	Bls.	450	15,300	2,850	22.9		

Cement Production in other Provinces, 1909 and 1910

		1909.	1910.	Increase.	%	Decrease.	%
Cement sold.....	Bls.	1,605,682	2,249,325	643,643	40.1		
Cement manufactured.....	"	1,863,445	1,900,000	36,637	2.0		
Stock on hand Jan. 1.....	"	322,366	588,760	256,394	77.1		
Stock on hand Dec. 31.....	"	590,129	239,517			350,612	59.4
Value of cement sold.....	\$	2,261,584	3,261,736	1,000,152	44.2		
Wages paid.....	"	659,489	666,502	7,013	1.1		
Men employed.....	No.	1,158	914			244	21.1
Total daily capacity of operating plants.....	Bls.	10,000	10,535	535	5.4		

Statistics of the annual production of Portland cement for a number of years showing the quantity made, the quantity sold, stock 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.....	608,990	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
1910.....	4,396,282	4,753,975	832,038	6,412,215	1 35	25,835

Imports and Exports.—There has been very little cement exported from Canada during past years. The value of the exports during 1910 was only \$12,914, as compared with a value in 1909 of \$113,362 and in 1908 of \$34,591. The quantity exported is not shown in the Customs reports.

The imports, which, previous to 1901, were larger than the Canadian production, have been decreasing since 1906, although in 1910 a considerable increase in imports is again shown. The imports in 1910 were 349,310 barrels or about 7 per cent of the total consumption, as compared with imports of 142,194 barrels in 1909 or about 3 per cent of the consumption in that year. A duty of 12½ cents per 100 pounds, equivalent to 42½ cents per barrel of 350 pounds net, is levied on imports. The weight of the package is, however, included for purposes of duty.

The United States was the principal source of imports of cement during 1910, supplying about 48 per cent of the whole. Great Britain supplied about 35 per cent of the imports in 1910, as compared with 64 per cent in 1909.

The imports of cement during 1909 and 1910 by countries were as follows:—

Imports of Cement.

	1909.			1910.		
	Cwt.	%	Value.	Cwt.	%	Value.
			\$			\$
Great Britain.....	322,148	64.7	104,060	433,578	35.5	130,951
United States.....	145,962	29.3	51,222	591,403	48.4	253,463
Belgium.....	15,761	3.2	5,029	66,595	5.4	20,618
Other countries.....	13,806	2.8	6,358	131,010	10.7	63,014
Totals.....	497,678	100.0	166,669	1,222,586	100.0	468,046
Equivalent in barrels.....	142,194			349,310		

Statistics of the exports 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	1905.....	3,143
1892.....	938	1899.....	2,733	1906.....	7,551
1893.....	1,172	1900.....	3,296	1907.....	9,618
1894.....	482	1901.....	1,514	1908.....	34,591
1895.....	937	1902.....	2,267	1909.....	113,362
1896.....	1,328	1903.....	2,851	1910.....	12,914
1897.....	644	1904.....	5,494		

Imports of Cement into Canada.

Fiscal Year.	Cement and Mfrs. of, N.E.S.*	Hydraulic Cement.		Portland Cement.	
		Barrels.	Valuc.	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	122,402	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	1,301,361	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	6,333	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
1910.....	7,678	588	553	490,809	158,487

* 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 1910 was 5,103,285 barrels (893,075 tons), made up of: 4,753,975 barrels (831,946 tons) of Canadian cement, or 93 per cent; and 349,310 barrels (61,129 tons) of imported cement, or 7 per cent.

In 1909 the total consumption was 4,209,903 barrels (736,733 tons), of which 97 per cent was made in Canada, and 3 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 ten 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
1910.....	4,753,975	93	349,310	7	5,103,285

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.....	
Montreal Mill No. 2.....	Kilbourn Siding, Que.....	
International Mill.....	Hull, Que.....	
Owen Sound Mill.....	Shallow Lake, Ont.....	
Belleville Mill.....	Belleville, Ont.....	
Lehigh Mill.....	Belleville, Ont.....	
Lakfield Mill.....	Lakfield, Ont.....	
Marlbank Mill.....	Marlbank, Ont.....	
Port Colborne Mill.....	Port Colborne, Ont.....	
Alberta Mill.....	Calgary, Alta.....	
Grey and Bruce Portland Cement Co.....	Owen Sound, Ont.....	Owen Sound, Ont.
The Sun Portland Cement Co., Ltd. (In liquidation).....	Owen Sound, Ont.....	Owen Sound, Ont.
The Imperial Cement Co., Ltd.....	Owen Sound, Ont.....	Owen Sound, Ont.
Hanover Portland Cement Co., Ltd.....	Hanover, Ont.....	Hanover, Ont.
The Ontario Portland Cement Co., Ltd.....	Blue Lake, Ont.....	Brantford, Ont.
The National Portland Cement Co., Ltd.....	Durham, Ont.....	Durham, Ont.
Kirkfield Portland Cement Co., Ltd.....	Raven lake, Ont.....	Toronto, Ont.
Superior Portland Cement Co., Ltd.....	Orangeville, Ont.....	Orangeville, Ont.
The Maple Leaf Portland Cement Co., Ltd.....	Atwood, Ont.....	Listowel, Ont.
The Crown Portland Cement Co., Ltd.....		Wariaton, Ont.
The Commercial Cement Co., Ltd.....	Babeoek, Man.....	Winnipeg, Man.
The Western Canada Cement & Coal Co.....	Exshaw, Alta.....	Ottawa, Ont.
The Rocky Mountain Cement Co.....	Blairmore, Alta.....	Blairmore, Alta.
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 Portland Cement Co.....	.....	Hamilton, Ont.
Bells Lake Portland Cement Co.....	.....	Markdale, Ont.
The Brant Portland Cement Co.....	.....	Brantford, Ont.
Canada Cement Co., (Quebec Mill).....	Neuville, Que.....	Montreal, Que.
British Columbia Portland Cement Co.....	.....	Princeton, B.C.

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.

According to the returns received the total production of clay products in 1910 was valued at \$7,629,956, as compared with a value of \$6,450,840 in 1909; showing an increase of \$1,179,116, or 18.3 per cent.

The total value of the production in 1908 was \$4,500,702 and in 1907, \$5,772,117.

These statistics represent actual sales; material produced but held in stock over the end of the year not being included until disposed of. The annual record is now fairly complete although there are still a number of small producers who neglect to send in their returns. For the year 1910 about 438 active firms reported sales of clay products; the average number of men employed was 8,656 and total wages paid, \$3,308,609. Of the total clay products production in 1910 about 78.5 per cent was made up of building and paving brick and about 15 per cent of sewerpipe and tile.

Production of Clay Products, 1909 and 1910.

	1909.			1910.		
	Quantity.	Valuc.	Per M.	Quantity.	Valuc.	Per M.
		\$	\$ cts.		\$	\$ cts.
Bricks—						
Common..... No.	539,228,708	4,212,424	7 81	627,715,319	5,105,354	8 13
Pressed..... "	57,264,656	630,677	11 01	67,895,034	807,294	11 89
Paving..... "	3,759,803	67,408	17 93	4,214,917	78,980	18 74
Ornamental.....		8,866		703,345	16,092	22 89
Firebrick and fireclay shapes, etc.....		78,132			50,215	
Fireproofing, and architectural terra-cotta, etc.....		113,886			176,979	
Pottery.....		285,285			250,924	
Sewerpipe.....		645,722			774,110	
Tiles, drain.....	27,571,097	408,440	14 81	24,562,648	370,008	
Totals.....		6,450,840			7,629,956	

Production of Clay Products, 1907 and 1908.

	1907.			1908.		
	Quantity.	Valuc.	Per M.	Quantity.	Valuc.	Per M.
		\$	\$ cts.		\$	\$ cts.
Bricks—						
Common..... No.	439,015,556	3,455,524	7 87	353,261,268	2,611,554	7 39
Pressed..... "	78,922,092	794,722	10 07	53,480,764	517,180	9 67
Paving..... "	3,617,720	72,354	20 00	3,719,961	59,456	15 98
Ornamental.....		47,288			18,535	
Firebrick and fireclay shapes, etc.....		131,322			110,302	
Fireproofing, and architectural terra-cotta, etc.....		89,389			170,211	
Pottery.....		253,809			200,541	
Sewerpipe.....		667,100			514,362	
Tiles, drain.....		260,609		20,100,261	298,561	14 85
Totals.....		5,772,117			4,500,702	

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

Production of Clay Products by Provinces, 1906-1910.

Province.	1906.	1907.	1908.	1909.	1910.
	\$	\$	\$	\$	\$
Nova Scotia.....	160,506	125,560	117,833	188,185	204,782
New Brunswick.....	49,220	57,377	75,513	65,570	56,475
Quebec.....	769,458	1,214,108	893,717	1,153,832	1,442,842
Ontario.....	3,136,870	3,123,372	2,476,152	3,425,841	3,667,810
Manitoba.....	517,065	466,432	265,091	559,008	781,605
Saskatchewan.....	136,022	125,459	87,566	145,516	160,850
Alberta.....	180,217	353,672	240,234	442,486	753,232
British Columbia.....	123,277	306,137	344,446	470,402	562,360
	5,072,635	5,772,117	4,500,702	6,450,840	7,629,956

Annual Value of Production of Clay Products, 1899-1910.

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	1910.....	7,629,956

Exports and Imports.—The only export of clay products recorded is that of building brick, of which the exports in 1910 were 390,000 valued at \$2,762, as compared with 365,000 in 1909 valued at \$2,255, and 2,344,000 in 1908 valued at \$9,047. The imports of clay and clay products into Canada are, on the other hand, quite considerable and amounted in value during the calendar year 1910 to \$4,331,397, equivalent to about 56 per cent of the domestic production. In 1909 the imports were valued at \$3,247,539, showing an increase in 1910 of \$1,083,858 or 33.4 per cent. 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 \$1,755,773, as compared with \$1,249,450 in 1909. Earthenware and china were imported to a value of \$2,283,116, as compared with \$1,781,759 in 1909, and clays to a value of \$292,508 in 1910, as compared with \$216,330 in 1909.

Imports of Clay Products, 1909 and 1910.

Imports.	12 months ending March, 1909.	12 months ending December, 1909.	12 months ending December, 1910.
	\$	\$	\$
Brick and tiles—			
Bathbrick.....	4,432	1,495	2,290
Building brick.....	108,773	195,360	274,482
Paving brick.....	101,187	139,366	124,994
Firebrick of a kind not made in Canada.....	350,457	485,994	811,927
Drain tile, not glazed.....	2,394	2,785	4,485
Drain pipe, sewerpipe, etc.....	106,399	170,280	175,599
Mfgs. of clay, N.O.P.....	141,391	254,170	361,996
	815,033	1,249,450	1,755,773
Earthenware and chinaware—			
Brown coloured.....	28,273	36,673	53,413
Demijohns, churns, and crocks.....	10,571	8,888	6,607
Tableware of china, porcelain, white granite.....	1,202,537	1,212,365	1,545,538
China and porcelain.....	87,798	87,467	95,509
Tiles or blocks of.....	43,299	56,974	90,524
Earthenware tiles, N.O.P.....	79,854	81,393	125,772
Mfgs. of earthenware, N.O.P.....	66,932	78,063	163,278
Earthenware, N.O.P.....	197,623	219,936	202,475
	1,716,887	1,781,759	2,283,116
Clays—			
China-clay.....	90,922	100,066	142,125
Fireclay.....	77,146	86,161	124,293
Pipeclay.....	887	310	114
Clays, all other, N.O.P.....	21,280	29,793	25,976
	190,235	216,330	292,508
Grand total.....	2,722,155	3,247,539	4,331,397

In addition to the imports shown in the above table, 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 calendar year 1910 was \$121,959: of which \$90,131 was from the United States and \$29,646 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," the value of such imports during 1910 being \$262,667, as compared with \$211,837 during the year 1909.

Imported clay products are derived chiefly from Great Britain and the United States, although considerable quantities of earthenware, china and porcelain ware, white granite or ironstoneware, etc., are brought from Germany, France, Austria-Hungary, and Japan. The imports during the fiscal year, showing the country of origin, are shown in the next table. Of the brick and tile imported 74.4 per cent was from the United States and 25.5 per cent from Great Britain; and only \$607 worth from other countries. Of the earthenware and chinaware 63 per cent was imported from Great Britain; 14 per cent from the United States; 8 per cent from Germany; 6 per cent from France, and considerable values also from Japan, Austria-Hungary, and other countries. The crude clays were imported principally from Great Britain and the United States.

Imports of Clay Products during the twelve months ending March, 1910, showing Countries of Origin.

Imports.	Great Britain.	United States.	Germany.	France.	Austria-Hungary.	Japan.	Other Countries.	Total.
Brick and tile:—	\$	\$	\$	\$	\$	\$	\$	\$
Bath brick.....	1,361							1,361
Building brick.....	21,158	197,017						218,175
Paving brick.....	65,057	73,706						138,763
Firebrick, of a class or kind not made in Canada.....	70,705	448,632		117				519,454
Drain tile, not glazed.....	513	2,052		174				2,739
Drain pipe, sewerpipe, and earthenware fittings therefor, chimney linings or vents, chimney tops and inverted blocks, glazed or unglazed.....	46,228	149,534					240	196,002
Manufactures of clay, N.O.P.....	137,321	127,419	69			7		264,816
Total.....	342,343	998,360	69	291		7	240	1,341,310
Earthenware and china, are:—	7,840	30,769	276	96	10		44	39,035
Brown or coloured earthenware and stoneware, and Rockingham ware.....	141,745	53,693	10,179	3,910	1,542	12,436	2,384	225,889
C. C. or cream coloured ware, decorated, printed or sponged, and all earthenware, N.O.P.....	485	7,021	7					7,513
Demijohns, churns or crocks.....								
Tableware of china, porcelain, white granite or ironstoneware.....	919,430	25,129	135,345	92,346	48,057	39,733	8,929	1,268,979
China and porcelain ware, N.O.P.....	30,580	11,222	14,145	8,368	5,574	22,332	1,538	93,750
Tiles or blocks of earthenware or stone prepared for mosaic flooring.....	14,100	47,566		2,404		7	1,082	65,159
Earthenware tiles, N.O.P.....	43,415	39,160		1,405			903	84,883
Manufacture of earthenware, N.O.P.....	13,173	54,590	1,816	1,469	478	2,364	195	74,085
Total.....	1,770,768	299,160	161,768	109,998	55,661	76,872	15,075	1,859,302

Imports of Clay Products during the twelve months ending March, 1910, showing Countries of Origin.—Continued.

Imports.	Great Britain.	United States.	Germany.	France.	Austria-Hungary.	Japan.	Other Countries.	Total.
	\$	\$	\$	\$	\$	\$	\$	\$
Clays:—								
China-clay, ground or unground.....	76,672	23,433					902	101,007
Pipeclay, ground or unground.....	20,535	65,155	173	88			200	86,151
Pipeclay, ground or unground.....	2,958	27,873					40	30,871
(Clays, all other, N.O.P.....)			173	88			1,142	218,232
Total.....	100,316	116,513	173				1,142	3,418,844
Grand total.....	1,613,427	1,384,033	166,010	110,377	55,661	76,879	16,457	100.00
Per cent of total.....	47.19	40.48	4.74	3.23	1.63	2.25	0.48	
Baths, bath-tubs, basins, closets, lavatories, urinals, sinks and laundry tubs of any material.....	31,611	198,567	65	10			4	230,257
Chalk, china or cornwall stone, cliff stone, and feldspar, fluorspar, magnesite, ground or unground.....	16,842	92,418	126	170	201		952	110,709

A record of the total annual value of the imports of clay products since 1900 is shown in the next table. In eleven years Canada has imported clay products to the value of \$25,500,738. The increase in imports has been most pronounced in the case of brick and tile, the imports of which in 1900 amounted to \$145,914, as compared with \$1,341,310 in 1910. The imports of earthenware and china-ware, and of clays have nearly doubled in the same time.

Imports of Clay Products (total value) 1900-10.

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.....	1,009,372	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
1910.....	1,341,310	1,859,302	218,232	3,418,844
	6,637,455	16,885,688	1,977,595	25,500,738

*9 months ending March 1907.

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

Dr. Heinrich Ries, who is investigating the clay resources of Canada for the Geological Survey, reports with respect to the clay working industry in the western provinces: 'The main clay-working industry at the present time is the manufacture of common brick, but the product in many localities, as around Victoria and Vancouver, does not supply the entire demand, and common brick are imported in large quantities from Seattle, Washington.

'Dry-pressed brick are made in small quantities at a number of points, but the only plants of large capacity are those at Medicine Hat and Clayburn.

'Most of the pressed brick now used in the western provinces are imported, and command a high market value. The same is true of fireproofing, terra-cotta, firebrick, pottery, and sewerpipe.

'It will be seen, therefore, that there is room for abundant development and expansion in the home clay-working industries.'

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 past four years in the following tables.

In 1910 the total production was 695,610,353, valued at \$5,912,648, made up of: 627,715,319 common, valued at \$5,105,354, or an average value per thousand of \$8.13; and 67,895,034 pressed brick, valued at \$807,294, or an average value per thousand of \$11.89. There were 397 active firms reporting as compared with 386 in 1909, and the value of production shows an increase of \$1,069,547, or 22 per cent.

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.

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 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.

Production of Clay Building Brick (Common and Pressed) 1909 and 1910.

Province.	1909.				1910.			
	No. of active firms reporting.	No. sold.	Value.	Per cent of total value.	No. of active firms reporting.	No. sold.	Value.	Per cent of total value.
			\$				\$	
Nova Scotia.....	12	18,875,000	114,795	2.37	15	18,730,000	113,436	1.92
New Brunswick.....	6	6,170,000	44,330	0.91	4	3,950,000	31,350	0.53
Quebec.....	54	101,471,567	690,918	14.27	62	130,287,310	929,492	15.72
Ontario.....	237	322,524,414	2,557,068	52.80	235	342,119,078	2,785,361	47.11
Manitoba.....	21	59,110,000	544,548	11.24	22	75,834,550	746,704	12.63
Saskatchewan.....	13	14,416,770	144,316	2.98	11	14,733,340	160,850	2.72
Alberta.....	28	45,479,855	441,606	9.12	29	73,639,771	750,982	12.70
British Columbia.....	15	28,445,758	305,520	6.31	19	36,316,304	394,473	6.67
Totals:.....	386	596,493,364	4,843,101	100	397	695,610,353	5,912,648	100

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

Province.	1907.			1908.		
	No. Sold.	Value.	Per cent of total value.	No. Sold.	Value.	Per cent of total value.
		\$			\$	
Nova Scotia.....	19,646,000	110,338	2.60	9,125,000	56,064	1.79
New Brunswick.....	4,941,141	36,937	0.87	6,594,011	54,573	1.74
Quebec.....	104,394,709	715,922	16.84	90,667,177	601,874	19.24
Ontario.....	2,930,763	2,311,499	54.38	221,600,575	1,664,184	53.19
Manitoba.....	1,094,180	465,282	10.95	26,818,000	254,531	8.14
Saskatchewan.....	12,024,070	125,459	2.95	8,262,996	87,566	2.80
Alberta.....	31,384,740	353,672	8.32	25,521,911	240,336	7.68
British Columbia.....	12,522,045	131,137	3.09	18,152,362	169,546	5.42
Totals.....	517,937,648	4,250,246	100.00	406,742,032	3,128,734	100.00

The production in the Maritime Provinces shows a slight falling off, although this may in part be due to incompleteness of the record, as only four firms in New Brunswick made returns in 1910 as compared with six in 1909.

The production in Quebec shows an increase of \$238,574 or 34.5 per cent; returns having been received from 62 active firms in 1910, as compared with 54 in 1909.

The Ontario production, which contributes 47 per cent of the total, shows an increase of \$228,293, or 8.9 per cent over 1909.

In the western provinces particularly, the production of building brick has greatly increased; the production in Manitoba was greater by \$202,156 or 37.1 per cent than in 1909. Saskatchewan's production was increased by \$16,534 or 11.5 per cent; that of Alberta by \$309,376 or 70.1 per cent, and of British Columbia by \$88,953 or 29.1 per cent.

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 \$6,600 in value per annum; but falling in 1909 and 1910 to \$2,255 and \$2,762 respectively. The annual imports for a number of years previous to 1903 averaged only about \$20,000 in value; during the past seven years, however, the value of the imports has varied from \$100,000 to over \$200,000 per annum. During the calendar year 1910, the imports were 29,049,000 brick valued at \$274,482; of which 1,993,000 valued at \$26,447, an average of \$13.27 per thousand, were imported from Great Britain; and 27,056,000 valued at \$248,035, an average of \$9.45 per thousand, from the United States. The imports during the calendar year 1909 were 27,972,000 brick, valued at \$195,360; of which 1,728,000 valued at \$21,680, an average of \$12.47 per thousand,

were imported from Great Britain; and 26,234,000 valued at \$173,680, an average of \$6.62 per thousand, 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.....	1,355	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				1910.....	390	2,762

Imports of Building Brick.

Fiscal Year.	M.	Value.	Fiscal Year.	M.	Value.	Fiscal Year.	M.	Value.
		\$			\$			\$
1880.....	340	2,067	1891.....	589	9,744	1902.....	4,087	33,802
1881.....	415	4,281	1892.....	621	5,075	1903.....	2,881	28,493
1882.....	3,500	24,572	1893.....	1,489	14,108	1904.....	13,455	117,468
1883.....	1,448	14,234	1894.....	2,220	18,320	1905.....	25,515	168,122
1884.....	3,263	20,258	1895.....	575	4,705	1906.....	21,934	194,897
1885.....	3,108	14,632	1896.....	1,057	23,189	1907 (9 mos.)	8,495	88,144
1886.....	983	5,929	1897.....	2,094	10,336	1908.....	13,790	139,105
1887.....	276	2,440	1898.....	639	6,652	1909.....	10,894	103,773
1888.....	2,483	20,720	1899.....	2,611	21,306	1910.....	30,444	218,175
1889.....	2,590	24,585	1900.....	1,792	19,305			
1890.....	1,933	12,500	1901.....	2,800	20,677			

Prices.—The price of brick varies greatly with the quality, locality, market or demand; the values as given in the table of production are those at the yard or kiln and do not include costs of delivery. They do not, therefore, represent the price to the consumer. The average price of common brick at the kiln in 1910 according to these returns was \$8.13, as compared with \$7.81 in 1909; and of pressed brick \$11.89, as compared with \$11.01 in 1909.

In the Maritime Provinces, during 1910, the price of common brick varied from \$4.80 to \$9, averaging for Nova Scotia \$5.77, and for New Brunswick \$7.83.

In Quebec the price of common brick varied between \$4 and \$10, averaging \$6.63; while the price of pressed brick averaged \$15, with only one firm reporting production. The average price of common brick in Ontario was \$7.88,

the limit of variation being \$4.70 and \$10; while for pressed brick the average was \$9.74 and the variation from \$8 to \$12.

In the western provinces the averages for common brick were fairly uniform from \$9.63 to \$9.81. In individual yards the prices varied from \$7.75 to \$12. Pressed brick in the west averaged \$16.27 per thousand in Manitoba; \$14.97 in Saskatchewan; \$19.01 in Alberta; and \$33.56 in British Columbia.

The following table shows the average values at the kilns of common and pressed brick in the several provinces during 1908, 1909, and 1910, as furnished by the producers:—

Average Prices per Thousand of Common and Pressed Brick.

	COMMON BRICK.			PRESSED BRICK.		
	1908.	1909.	1910.	1908.	1909.	1910.
	\$ cts.	\$ cts.	\$ cts.	\$ cts.	\$ cts.	\$ cts.
Nova Scotia.....	5 81	5 69	5 77	13 84	12 36	12 27
New Brunswick.....	8 17	7 14	7 83	16 70	12 00	12 00
Quebec.....	6 37	6 38	6 63	11 62	14 00	15 00
Ontario.....	7 24	7 71	7 88	8 74	9 46	9 74
Manitoba.....	9 24	9 14	9 81	15 45	12 00	16 27
Saskatchewan.....	10 46	9 66	9 63	11 18	14 00	14 97
Alberta.....	8 60	9 21	9 63	12 97	13 03	19 01
British Columbia.....	9 21	9 73	9 77	20 40	31 05	33 56
Canada.....	7 39	7 81	8 13	9 67	11 01	11 89

Ontario.—This Province has for a number of years past produced over 50 per cent of the clay building-brick production in Canada, though the percentage in 1910 has fallen to 47. The vicinity of the city of Toronto, including the counties of York and Halton, is the principal brick making section and in 1910 produced about 62 per cent of the Ontario production, or about 29 per cent of the total Canadian production of brick.

The district next in importance is the county of Wentworth, comprising the city of Hamilton and vicinity, producing about 6 per cent of the Ontario production. The Ottawa district, including the counties of Russell and Carleton, also produced about the same amount. Other important districts are Algoma and Nipissing, which cover a wide area, and the counties of Waterloo, Middlesex, Grey, and Kent. These eleven counties contributed over 85 per cent of the Ontario production. Practically all the pressed brick reported as such was made in the Toronto and Hamilton districts.

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.....	157,634,189	1,314,153	8 34	16,773,221	172,183	10 27	1,486,336	53.36
Halton.....				25,120,000	238,361	9 49	238,361	8.56
Wentworth.....	19,024,051	134,825	7 09	4,100,000	36,119	8 81	170,944	6.14
Russell.....	12,950,000	97,800	7 55				97,800	3.51
Carleton.....	9,664,000	87,231	9 03				87,231	3.13
Algoma.....	8,815,000	78,650	8 92				78,650	2.83
Nipissing.....	4,700,000	51,000	10 85				51,000	1.82
Waterloo.....	7,140,159	50,431	7 06				50,431	1.81
Middlesex.....	5,956,150	43,413	7 29	30,000	240	8 00	43,653	1.57
Grey.....	6,387,000	11,004	6 42				41,004	1.47
Kent.....	4,800,200	30,846	6 43	100,000	800	8 00	31,646	1.14
Total, 11 counties....	237,070,749	1,929,353	8 14	46,123,221	447,703	9 71	2,377,056	85.34
Total, other counties.	56,362,020	382,004	6 78	2,563,088	26,301	10 26	408,305	14.66
Total, Ontario.....	293,432,769	2,311,357	7 88	48,686,309	474,004	9 74	2,785,361	100.00

The annual production of common and pressed brick in this Province for 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.

	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
1910.....	304,988	2,374,287	7.785	44,204	458,596	10.375

Manitoba.—The production of building brick in Manitoba in 1910 was 75,834 thousand valued at \$746,704, as compared with 59,110 thousand valued at \$544,548; an increase of 37 per cent in the value of production.

Mr. Joseph Keele, who is associated with Dr. H. Ries in an investigation of the clay resources of Canada, reports:—

“About twenty-six brickyards are in operation in Manitoba; of these about four produce dry press bricks, and the rest, with the exception of one stiff mud machine at Alsip’s yard in Winnipeg, turn out soft mud bricks.

“The burning is most easily done in scove kilns, the fuel being generally dry poplar wood, but a few of the more progressive plants have down draft kilns and burn coal. The season’s output varies from 500,000 to 12,000,000 in the various yards, the average length of the season being about 150 days.

“The principal difficulties met with by brickmakers using surface clays are: the liability of the green brick to air check while on the drying racks, and in judging the proper degree of burning. Calcareous clays have their points of incipient vitrification and fusion so close together that quantities of the brick near the arches are melted, while the upper layers, which receive the least amount of heat, are under-burned and soft, consequently there is great waste. It seems impossible to avoid this in scove kilns, but there is far less waste, and a greater economy of fuel in down draft kilns.

“If the clay is mined in the autumn, and allowed to weather in a stockpile over winter, subsequent air checking in the drying racks will be considerably reduced, the clay will be easier to work, and it will be available for use earlier in the spring; but only in one instance that came under my notice was this method taken advantage of.

“There was a great scarcity of brick in Manitoba during the early part of the building season of 1910. No brick were left over from the season of 1909, and on June 1 there was not a kiln of brick yet burned in the Province. On the night of June 2, about 2,000,000 brick were frozen on the drying racks, and consequently destroyed.

“Common brick usually sell in Winnipeg for \$11 per thousand, but this summer they sold as high as \$15, and as the local yards were unable to supply the demand large quantities were imported. Most of the pressed brick used for facing buildings is imported.

“All the structural hollow ware and sewerpipe used in the Province is imported, but the use of paving brick is prohibited by the high freight rates on such a heavy commodity.”

Saskatchewan.—Returns from eleven operating firms show a production in 1910 of 14,733 thousand brick, valued at \$160,850, as compared with 14,417 thousand valued at \$144,316 in 1909.

The principal brick plants are located at Estevan, Prince Albert, Saskatoon, Rosthern, Verigin, and Yorkton.

Alberta.—Twenty-nine operating firms reported a production of 73,640 thousand brick valued at \$750,982, as compared with 45,480 thousand valued at \$441,606 in 1909 by twenty-eight firms; showing an increase in value of production of \$309,376 or about 70 per cent. As in the other western provinces, the production has been rapidly increasing. Several new plants were in course of construction during the year which were expected to be ready for operation during 1911. The principal centres of present production are Edmonton, Calgary, Medicine Hat, and Lethbridge.

British Columbia.—The production during 1910 by nineteen active firms was 36,316 thousand brick valued at \$394,473. These statistics include reliable estimates for two firms that did not report directly to this Department. The production by fifteen firms in 1909 was reported as 28,445 thousand brick valued at \$305,520. The average price at the yard of common brick during the year was \$9.77, while pressed brick sold at from \$20 to \$40 per thousand. Vancouver, New Westminster, Port Haney and vicinity, Victoria, and Sydney are the principal centres for the production of common brick, while pressed brick are made in considerable quantities at Clayburn.

Paving Brick.—Hitherto the only paving brick made in Canada have been those made at West Toronto from shale found on the banks of the Humber river. A beginning has, however, now been made in the manufacture of paving brick in British Columbia at Clayburn, by the Clayburn Brick Co., from shales found in Sumas mountain. The annual production in Ontario has been fairly constant at from 3,000,000 to 5,000,000 brick per season, and 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 1910 the number of paving brick sold was 4,215,000, valued at \$78,980, while during the same year there were imported 10,503 thousand paving brick, valued at \$124,994. These imports include: 2,786 thousand, valued at \$29,936, or \$10.75 per thousand, from the United States, and 7,717 thousand, valued at \$95,058, or \$12.32 per thousand, from Great Britain.

Annual Production of Paving Brick.*

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	1910.....	4,215	78,980	18 74

(* 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.....	3,350	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.).....	2,192	23,256	10 64
1900.....	2,175	35,644	16 39	1908.....	5,340	61,346	
1901.....	900	10,414	11 57	1909.....		101,187	†
1902.....	1,030	16,788	16 30	1910.....		138,763	

*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 1910 was \$50,215; as compared with a valuation of \$78,132 in 1909, \$110,302 in 1908, and \$131,322 in 1907.

The production in 1910 comprised 1,375,400 firebrick valued at \$29,352, or an average of \$21.34 per thousand; fireclay sold was 1,425 tons valued at \$5,863, and other fireclay products valued at \$15,000.

The production of 1909 comprised 1,059,270 firebrick valued at \$32,742, or an average of \$30.92 per thousand; 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 thousand; 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 thousand; and other fireclay shapes to the value of \$18,000.

The imports of firebrick during the calendar year 1910 were valued at \$811,927: of which \$734,908 worth were imported from the United States and \$76,902 from Great Britain. Fireclay was imported during the calendar year 1910 to the value of \$124,293, as compared with a value of \$86,161 in 1909.

The following table gives a record of the imports of fireclay and firebrick since 1900, the figures being in each case for the fiscal year.

Imports of Firebrick and Fireclay, 1900-10.

Fiscal Year.	Fireclay.	Firebrick.	Fiscal Year.	Fireclay.	Firebrick.
	\$	\$		\$	\$
1900.....	59,291	39,535	1906.....	131,130	51,892
1901.....	79,530	32,831	1907*.....	85,044	349,185
1902.....	64,541	45,608	1908.....	155,873	639,347
1903.....	94,509	34,522	1909.....	77,146	350,457
1904.....	52,716	38,335	1910.....	86,151	519,454
1905.....	73,837	44,746			

*9 months ending March.

Sewerpipe and Drain Tile.—The total value of the sales of sewerpipe in 1910 was \$774,110; as compared with a value of \$645,722 in 1909, and a value of \$514,362 in 1908.

The imports of drain pipe and sewerpipe during the calendar year 1910 were valued at \$175,599: of which \$140,259 worth were imported from the United States, \$35,149 from Great Britain, and \$191 from other countries.

The imports of 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.

Following is a list of firms manufacturing sewerpipe:—

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

In addition to the above the Alberta Clay Products Company has built an extensive plant at Medicine Hat, Alberta, for the manufacture of brick, sewerpipe, and other clay products.

The production of drain tile as reported to this Branch was not as large in 1910 as during 1909. The total sales in 1910 were 24,562,648 valued at \$370,008, an increase of \$15.06 per thousand; as compared with sales of 27,571,097 valued at \$408,440, an average of \$14.81 per thousand, in 1909. The sales in 1908 were reported as 20,418,000, valued at \$298,561. The Ontario Bureau of Mines reports the total number made in that Province during 1910 as 21,028,000, valued at \$318,456, or an average of \$15.14 per thousand; as compared with 27,418,000 valued at \$363,550, or an average of \$13.25 per thousand, in 1909. The sales in Ontario during 1910, according to direct returns to this Branch, were 22,810 thousand, valued at \$334,402, or 93 per cent of the total production in Canada.

The imports of unglazed drain tile are comparatively small, the value during the calendar year 1910 being \$4,485 only, as compared with \$2,785 in 1909.

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	1901.....	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	1910.....	774,110
1895.....	257,045	1903.....	317,970		

Production of Drain Tile in Ontario.

(As ascertained by the Ontario Bureau of Mine. . .)

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	1910....	21,028,000	318,456
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	1896.....	339	18,957
1881.....		37,368	1897.....	416	33,870
1882.....		70,061	1898.....	157	29,454
1883.....		70,699	1899.....	1,817	32,071
1884.....	5,585	66,170	1900.....	1,383	37,766
1885.....	2,911	66,678	1901.....	1,264	54,819
1886.....	1,905	56,048	1902.....	269	55,261
1887.....	2,183	69,020	1903.....	252	57,100
1888.....	4,290	96,967	1904.....	1,637	53,958
1889.....	2,346	80,869	1905.....	1,229	101,166
1890.....	3,780	73,654	1906.....	4,727	131,353
1891.....	673	86,522	1907 (9 mos.).....	12,106	93,453
1892.....	473	59,064	1908.....	2,080	125,747
1893.....	110	38,891	1909.....	2,394	106,399
1894.....	53	24,572	1910.....	2,739	196,002
1895.....	605	20,358			

(a) Drain tile, not glazed.

(b) Drain pipes, sewerpipes, and earthenware fittings therefor, 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, jardinières, 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 clay sanitary ware in 1910, according to returns received, was \$250,924; as compared with a valuation of \$285,285 in 1909, and \$200,541 in 1908. Annual statistics of production are shown herewith.

Annual Production of Pottery.

Calendar Year.	Value.	Calendar Year.	Value.	Calendar Year.	Value.
	\$		\$		\$
1888.....	27,750	1886.....	163,427	1904.....	140,000
1889.....	Not available	1897.....	129,629	1905.....	120,000
1890.....	195,242	1898.....	214,675	1906.....	150,000
1891.....	258,844	1899.....	185,000	1907.....	253,809
1892.....	265,811	1900.....	200,000	1908.....	200,541
1893.....	213,186	1901.....	200,000	1909.....	285,285
1894.....	162,144	1902.....	200,000	1910.....	250,924
1895.....	151,588	1903.....	200,000		

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 1910 were valued at \$2,283,116, as compared with a value of \$1,781,759 in 1909. These imports are subdivided into eight classes and in 1910 include: brown coloured ware, \$53,413; demijohns, churns, and crocks, \$6,607; tableware of china, porcelain, white granite, \$1,545,538; china and porcelain, \$95,509; tiles or blocks of earthenware or stone prepared for mosaic flooring, \$90,524; earthenware tiles, N.O.P., \$125,772; manufactures of earthenware, N.O.P., \$163,278; earthenware, N.O.P., \$202,475. Great Britain is the principal source of the imports of this class of products, but quite large supplies are also obtained from the United States, Germany, France, Austria-Hungary, Japan, and other countries.

Imports of Earthenware and Chinaware.

Fiscal Year.	Value.	Fiscal Year.	Value.	Fiscal Year.	Value.
	\$		\$		\$
1880.....	322,333	1891.....	634,907	1902.....	1,275,093
1881.....	439,029	1892.....	748,810	1903.....	1,406,610
1882.....	646,734	1893.....	709,737	1904.....	1,611,356
1883.....	657,886	1894.....	695,514	1905.....	1,636,214
1884.....	544,586	1895.....	547,935	1906.....	1,692,359
1885.....	511,853	1896.....	575,493	1907 (9 mos.).....	1,422,880
1886.....	599,269	1897.....	595,822	1908.....	2,190,784
1887.....	750,691	1898.....	675,874	1909.....	1,716,887
1888.....	697,082	1899.....	916,727	1910.....	1,859,362
1889.....	697,949	1900.....	959,526		
1890.....	695,206	1901.....	1,114,677		

Investigation of the Clay Resources of Canada.

An investigation of Canadian clay resources was initiated by the Mines Branch in 1905 when a report was prepared on the clay resources of Manitoba. This work has been continued under the Geological Survey Branch by Dr. Heinrich Ries, who has made similar investigations into the clay resources of many parts of the United States. Dr. Ries has been assisted in this work by Mr. Joseph Keele of the Geological Survey. The season of 1909 was spent in the Maritime Provinces and 1910 in the western provinces from Manitoba to British Columbia. Preliminary reports on these investigations have been published in the Summary Report of the Geological Survey for 1909 and 1910 and also in the Transactions of the Canadian Mining Institute for 1910 and 1911, and a complete report on the clay and shale deposits of Nova Scotia and portions of New Brunswick, has just been issued by the Geological Survey.¹

The results of the field investigations in the Maritime Provinces, as published in the Summary Report of the Geological Survey for 1909, were quoted in the report of this Branch on the Production of Structural Materials and Clay Products, during 1909. With respect to the laboratory tests on these clays, Dr. Ries states:—

“The laboratory tests have shown that many of the Nova Scotia and New Brunswick clays and shales can be utilized for pressed brick manufacture, and as there are practically no producers of pressed brick eastward of Ontario, there would appear to be a good field for enterprise in this direction.”

Dr. Ries reports as follows on his field investigations during 1910:—

“The field work was begun at Winnipeg, Man., and extended westward as far as Victoria, B.C., but the present summary covers the territory between Regina and the coast.

“Samples were collected from many localities, for the purpose of testing; but as the laboratory investigation of these is not yet complete, only the mode of occurrence of the clays and shales, and the industry based thereon, is referred to.

“With reference to the geographic distribution of the clays and shales, it may be pointed out that the most extensive and important deposits lie east of the Cordilleran area, in other words, in the region of the Great Plains; while second in extent are the deposits of the Pacific coast belt.

“Few or none are found in the region lying between the eastern boundary of the Rocky Mountains and the Coast ranges.

“Geologically, the clays and shales show a somewhat restricted distribution, ranging from Jurassic to Pleistocene.

“For convenience of description the occurrences may be divided into three areas, viz.: The Great Plains, the Cordilleran, and the Pacific coast.

¹The clay and shale deposits of Nova Scotia and portions of New Brunswick, Memoir No. 16-E.

GREAT PLAINS REGION.

"In that portion of the Great Plains area lying west of the longitude of Regina and Prince Albert, surface clays and silts are abundantly distributed, and often used locally for the manufacture of common brick. The product thus made is usually of red colour, and often highly porous, but since in many districts no other material is locally available, it has to be used. Those clays which are strongly calcareous yield a buff brick.

"The Pleistocene clays and silts referred to above are in most cases glacial deposits, some of them containing small pebbles, at times of calcareous character. They are worked around Regina, Saskatoon, Prince Albert, Moosejaw, Medicine Hat, Red Deer, Cochrane, and other places of minor importance.

"At some points, as Edmonton, flood plain deposits are extensively employed for making common and pressed brick. In most cases, however, the surface clays are not adapted to pressed brick manufacture.

"There are certain areas, some of them rather extensive, that are underlain by clays and shales of Tertiary or Cretaceous age, which hold out strong promise for the future, and whose prospective value has been, in part at least, realized, even at the present time. I refer to the areas around Dirt hills, Souris valley, Medicine Hat, Edmonton, and Calgary.

"*Dirt Hills Area.*—This name is applied to a group of hills rising from the plains about 30 miles south of Moosejaw, and extending south and southeastward for some distance. The beds are of Laramie age; and about 23 miles south of Drinkwater, on the Portal branch of the Canadian Pacific railway, there are exposed a series of white and brown clays in the outer slopes of the Dirt hills. The beds appear to dip westward, and the hills in which the clays occur have a steep eastern face, and a western slope conformable to the dip.

"The predominant beds are white and greyish white sandy clays, and brownish red siliceous clay shales, as well as some gypsiferous beds and bluish clays. The white sandy beds, which form the larger part of three hills, are quite prominent, and contain occasional lenses of a finer grained white clay.

"The succession of beds, from the bottom up, where the white clays are best exposed, appears to be as follows:—

Brownish clay-shales.

Soft sandstone.

Grey clay.

White sandy clay.

Thin beds of purplish and bluish shale.

Brownish clay-shales.

White and grey clays.

"The white clays are fireclays, fusing at cones 30 to 32.

"Some of the white sandy clay has been hauled up to Moosejaw and made into boiler setting brick, with good results.

"The practical development of these clays hinges upon a satisfactory solution of the transportation problem, and this may occur at no distant date, as there is said to be a projected branch of the Canadian Northern, which will pass within three miles of these clay deposits.

"*Souris Valley.*—The lignite seams of the Souris coal-field have been described by Dowling,¹ and in his paper mention is made of the sandstones and shales which are interbedded with the lignites. There seems little doubt that many of these shales could be utilized for the manufacture of clay products, but up to the present time not much has been done to develop them.

"The only locality at which they are worked is at Estevan, Sask., where the shales belonging to the upper member of the coal series in that field are mined by the Estevan Coal and Brick Company.

"The section shown in their workings is as follows:—

Top glacial clay	10 to 20 ft.
Lignite	8 ft.
Parting clay shale	2 to 2½ ft.
Lignite	8" to 2 ft.
Blue clay shale upper 15 feet smooth	30 to 40 ft.

"The top clay, which is highly calcareous and cream burning, is used for making common brick.

"The shale, which is won by drift mining, is used for making dry-pressed brick. It is red burning.

"Shales are found at a number of other points in the Souris River coal field, but some of them crack in air-drying. One very smooth plastic deposit was found overlying the clay at Pinto.

"*Medicine Hat.*—This town lies in the Belly River shale area, the beds of this formation being exposed at a number of points along the Saskatchewan river, as well as in the slopes of some of the surrounding hills, where the shales have not been removed by pre-glacial erosion, or are not covered by glacial clays or silts.

"It may be said of the shales of this area in general, that they consist of more or less lenticular bodies of clay shales, and shales which are sometimes separated by lenses of sandstone.

"The lenticular character of the beds is proven by the fact that their structural relations can sometimes be well seen in one excavation, and also because

¹Can. Geol. Survey, Annual Report, Vol. XV, pt. F.

sections on opposite sides of the river may be totally unlike so far as regards the beds over and underlying the same coal seams.

"The shales show a variety of colours, and range from highly siliceous to those of very fine grain. Some of the beds evidently contain a large amount of colloidal material, and have to be dried very slowly to prevent cracking, but this cannot always be avoided. Some of them may be cured of cracking by pre-heating, and experiments are now under way to determine this.

"Most of the shales of the Medicine Hat region are not refractory, and only one of the beds thus far opened up is claimed to be a good fireclay.

"The Belly River shales are now worked near Coleridge, and Red Cliff. At the former locality the shales outcrop on the slope of a steep ridge, and are said to have been tested by 80 ft. borings. The beds show the usual lenticular arrangement, and since the lenses vary in character, and are interbedded in places with sandstone, some selective mining and sorting is necessary. Among the types of clay thus far identified here by the owners are: sewerpipe, pressed brick, and fireclay.

"The shales are loaded on cars, which are run down a spur to the Canadian Pacific railway, and thence to Medicine Hat, where they are to be used at the new and extensive plant of the Alberta Clay Products Company.

"At Red Cliff, 6 miles up the Saskatchewan river from Medicine Hat, a somewhat deep section is exposed in a coulee running from the top of the cliff down to the river level. The shale bank has been opened up about half way down the coulee, and the section is somewhat as follows:—

Shales with sandstones.	50 feet.
Dark, chocolate clay, checks in drying.	3 "
Alternating shales, silts, and some lignite seams.	30 "
Lignite.	5 "
Sandy shales.	15 "
Lignite.	4-5 "
Carbonaceous shale.	2 "
To river level (concealed) about.	50 "

"The run of the bank is used for making a red, wire-cut brick, while one bed in the upper part of the bank is employed for dry press. All of the shales are red-burning, and it is not likely that any of them are refractory.

"The raw material is worked up in the recently established plant of the Red Cliff Brick Company.

"Directly across the river is another coulee, showing an equally deep section, but the beds are entirely different, and are mostly very sandy in character.

"*Edmonton.*—There are four possible sources of clay or shale in this area as follows:—

" (1). Flood plain clays, of very silty or even sandy character, underlying the low terrace bordering the Saskatchewan river. This material is used for common pressed brick.

" (2). Glacial (?) clays of highly plastic character, underlying the upper level terrace on which *Strathcona* and *Edmonton* stand.

" (3). Shales underlying many of the coal seams, and usually too thin to be utilized.

" (4). Shales higher up in the section than the coal seams at *Edmonton* and *Strathcona*.

"The last named appear to represent the best type of material found in the immediate vicinity of *Edmonton*. The best observed exposures lie just northeast of *Strathcona*, in the valley of Mill creek, and along the *Edmonton*, *Yukon*, and *Pacific* railway. They are exceedingly plastic, and are said to burn to a vitrified body. No claim is made for a high refractoriness, and some of them have a rather high air shrinkage. This horizon should be carefully prospected to determine the occurrence of clays at other localities.

"The development of the clays around *Edmonton* is a matter of the highest commercial importance, as the demand there for all grades of structural clay products is large.

"South of *Edmonton*, between that point and *Calgary*. Tertiary shales are found outcropping along the *Red Deer* river, near the town of *Red Deer*. Some of those weather to a very plastic clay, but they are not utilized.

"*Calgary.*—The Cretaceous shales are the most important clay sources of this district. They evidently underlie a considerable area, but at most points the outcrops have been obscured by glacial drift. The shales have, however, been opened up for miles west of *Calgary*. At both points the bank shows massive layers of grey and buff shale, interbedded with beds of sandstone up to 2 and 3 feet in thickness. The latter have to be rejected in quarrying.

"Although the shales contain sufficient lime carbonate to effervesce briskly with acid, there is not sufficient to destroy the red burning character of the material. It is used at both localities for making dry pressed brick.

"At *Cochrane*, west of *Calgary*, there are somewhat extensive exposures of shale, some of which are free from the sandstone beds, so abundant at the two localities mentioned above.

"*Other Localities.*—The *Belly River* shales are well exposed along the *Belly* river at *Lethbridge*, and also in the workings of the coal mines there. Those associated with the coal are often highly carbonaceous, and often gritty, but some, such as those exposed along the wagon road near the bridge across the

river, work up to a very plastic mass, even though they appear rather unpromising in the outcrop.

"There are also abundant shale beds from 2 to 6 or 8 feet in thickness, interstratified with Cretaceous sandstones, in the low foothills west of Lundbreck. They are best seen in the railway cuts between that town and Hillcrest. Their value and character cannot be definitely stated until the tests on them are completed.

"A somewhat important shale bed overlies the coal along the south fork of the Oldman river, 6 miles northwest of Pincher creek, and other Cretaceous clays outcrop in the creek bank on the western edge of the town, as well as several miles to the southwest along Mill creek.

"Cretaceous shales of gritty character have also been quarried at Seebe siding, east of Kananaskis. Eastward from there along the Bow river, Cretaceous outcrops are frequent, and the entire section should be carefully searched.

CORDILLERAN REGION.

"The occurrence of extensive clay deposits was not expected in this region, but nevertheless all reasonable precautions were taken to search for them.

"In the Crownsnest Pass district, the Ferrie shales have been utilized at Blairmore for making a red, dry-pressed brick, of good quality. Similar shales occur at Coleman.

"Shales are associated with the coal seams at Cammore and Bankhead, but are not adapted to brick manufacture.

"Flood plain and glacial clay deposits of small extent occur in many of the valleys, and are worked at several localities, including Nelson, Castlegar Junction, Kamloops, and Enderby.

"A deposit of colluvial clay, derived from the phyllites on the slopes of Mount Stephen, is found at Field, and a fine-grained plastic clay, suitable for earthenware, occurs in the Yoho valley.

"From the preceding paragraphs it will be seen that no fireclays appear to be known in the Cordilleran region. This is unfortunate, since there are several smelters, and numerous coke ovens in operation, which now have to obtain their supplies of firebrick from the United States and England.

"It is hoped that this demand will be supplied in the future by bricks made from the fireclays at Clayburn, or possibly those of the Dirt hills, or even the fireclay (if it proves to be such) at Medicine Hat.

PACIFIC COAST BELT.

"The Tertiary beds of Sunas mountain, near Clayburn, contain one of the most interesting series of shales to be found in the western provinces.

"The section involves a series of shales, sandstones, and at least one conglomerate. Some quartz porphyry is present, but not in contact with the worked shale deposits.

"The entire series appears to dip southwest at an angle of about 15° to 20° and the shales range from those of a highly refractory character to others of much lower refractoriness. On this account some of the shales burn buff, and others red.

"At the base of the section, there appear to be at least two beds of fireclay, the lowest one divisible in some places into three parts. Of these the lowest bench is called a china-clay, and is said to burn white, but our tests show that it does not. The middle and upper bench are separated by a seam of coal, of variable thickness and containing flint clay partings. Some of the best fireclay in the mine has a fusing point of cone 32.

"These shales are said to be adapted to the manufacture of pressed, paving, and firebrick, and sewerpipe.

"Pleistocene clays are found on the lower slopes of the mountain, and can be used for common brick.

"There is now a factory in operation at Clayburn, that of the Clayburn Brick Company. A narrow gauge road has been laid for a distance of 3 miles up a gulch in Sumas mountain, and the total rise in this distance is 450 feet. The mines belonging to the Company are located along the line of this railway.

"Other deposits not yet developed are found on the opposite side of the mountain, but these will probably be opened up before long.

"Around Vancouver, along the Fraser river, at least as far east as New Westminster, and at Sumas mountain, as well as other points, there are deposits of a bluish grey stratified Pleistocene clay, which usually forms lenticular deposits, surrounded by coarse sand. The clay is of value for common bricks and is worked at New Westminster, Clayburn, Port Haney, etc.

"A glacial clay is employed for common and pressed brick manufacture on Arvil island, in Howe sound. Similar material is also worked on Sidney island, and around Victoria.

"Sewerpipe and fireproofing are made at Victoria from shales obtained near Comox, Vancouver island, and residual fireclay from the northwest end of the same island."

Mr. Keele reported as follows with respect to field investigations in Manitoba:—

"About 20 samples of clays and shales were collected at various worked and unworked localities. The limitations and possibilities of these materials will be fully considered in a report to be issued after the series of tests that are now in progress are completed.

¹ Summary Report of the Geological Survey Branch, Department of Mines, 1910, p. 181.

"The material available for structural purposes is obtained from two sources—surface clays and shales.

"The surface clays, which are usually lake or estuarine deposits, some of which may be of direct glacial origin, are the most widespread. Notwithstanding the fact that these surface deposits are, in many places, of great depth, only a limited portion of them unfortunately can, in some localities, be utilized by the clay worker. This is the case in the neighbourhood of Winnipeg, where only about 3 feet of the deposit can be used, and although there is often as much as 40 feet of clay of different quality beneath this, it is quite unsuitable for brick-making purposes. At Brandon the surface deposits consist of stratified sands, silts, and clays, with the sandy and silty layers so much in excess that good hard brick cannot be produced from them.

"At Portage la Prairie, Virden, Hartney, and Gilbert Plains, there are good deposits of clay, which can be worked to as great a depth as the brickyard owners desire. There is only a light covering of soil to be removed, and in places the brick clay comes almost to the grass roots.

"The surface clays in Manitoba are nearly all calcareous, the lime content being usually high. The underburned bricks made from them are of a light red colour, and soft and porous; the fully burned bricks are hard, light buff in colour, and make a good durable building material.

"Shales of Cretaceous age form the bed-rock of most of the western portion of the Province, but on account of the thick mantle of surface deposits, they are not generally seen outcropping. They outcrop plentifully at some localities, however, notably at the Riding and Pembina mountains, and at two points are worked for brickmaking purposes. The shales, where exposed, are generally hard and non-plastic, so that when finely ground and mixed with water they cannot be moulded into shapes; but in some cases they are decomposed by weathering, and become quite soft and plastic. The shale used for making dry press brick and for siding is in this condition. The shales burn to a red colour, and will stand much harder firing than the surface clays."

LIME.

The production of lime during 1910 did not show as large an increase over the previous year's output as did the other structural materials. The total sales were reported as 5,848,146 bushels, valued at \$1,137,079, or an average of 19 cents per bushel; as compared with 5,592,924 bushels, valued at \$1,132,756, or an average of 20 cents per bushel in 1909.

Production was reported by 70 active firms as compared with 84 firms in 1909. The average number of men employed was reported as 976 and wages paid \$466,876. There was apparently a falling off in production in the Maritime Provinces and in Quebec and an increase in Ontario and the western provinces. The average price per bushel of sales was also lower in the east and higher in the west. Four firms only reported the sale of a small quantity of hydrated lime.

A small quantity of lime is annually made in Prince Edward Island, but from stone brought over from Nova Scotia, and the figures have been included in the statistics for this Province.

Lime Production by Provinces, 1910.

Province.	No. of active firms reporting.	Men employed	Wages paid.	SALES.			
				Bushels.	Value.	Average per bushel.	Per cent of total.
			\$		\$	cts.	%
Nova Scotia.....	4	45	10,505	55,750	13,490	24	1.2
New Brunswick.....	6	109	42,524	470,050	105,593	22	9.3
Quebec.....	17	223	107,275	1,227,555	299,126	23	26.3
Ontario.....	31	410	180,557	2,983,020	476,137	16	41.9
Manitoba.....	5	95	48,707	606,679	100,808	17	8.8
Alberta.....	3	29	21,700	303,214	69,268	23	6.1
British Columbia.....	4	65	55,608	196,878	72,657	37	6.4
Total.....	70	976	466,876	5,848,146	1,137,079	19	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	33.3
Manitoba.....	138,786	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	1,132,753	20	100.0

As with the other structural materials, Ontario is the largest producer, this Province being credited with about 42 per cent of the total value in 1910. Quebec was the second largest producer with 26 per cent of the total value, New Brunswick following with 9.3 per cent, and Manitoba with 8.8 per cent. The average price per bushel at kiln ranged from 16 cents in Ontario to 37 cents in British Columbia.

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. With the exception of those for 1910 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.....	1,800,000	222,000	12	1904.....	2,600,000	406,800	16
1897.....				1905.....	3,100,000	424,700	14
1898.....	2,620,000	308,000	12	1906.....	2,885,000	496,785	17
1899.....	4,322,500	535,000	12	1907.....	2,650,000	418,700	17
1900.....	3,893,000	544,000	14	1908.....	2,442,331	448,596	18
1901.....	4,100,000	550,000	13	1909.....	2,633,500	470,858	18
1902.....	4,300,000	617,000	14	1910.....	2,889,235	474,531	16
1903.....	3,400,000	520,000	15				

Exports and Imports.—The value of the lime exported during the calendar year 1910 was \$44,762, the destination of shipment being mainly the United States. The imports during the same period were 212,502 barrels, valued at \$138,847, and were also derived chiefly from the United States.

Annual statistics of exports and imports are given in the next 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	1910.....	44,762
1897.....	53,177	1904.....	73,838		

Imports of Lime.

Fiscal Year.	Barrels.	Value.	Fiscal Year.	Barrels.	Value.
		\$			\$
1880.....	6,100	6,013	1896.....	10,239	7,331
1881.....	5,796	4,177	1897.....	16,108	10,529
1882.....	5,064	5,365	1898.....	12,850	9,002
1883.....	7,623	9,224	1899.....	15,720	11,124
1884.....	10,804	11,200	1900.....	12,865	11,211
1885.....	12,072	11,503	1901.....	19,657	14,534
1886.....	11,021	9,347	1902.....	24,602	17,584
1887.....	10,835	8,524	1903.....	31,108	22,470
1888.....	10,142	7,537	1904.....	54,359	39,639
1889.....	13,079	9,363	1905.....	98,676	71,588
1890.....	8,149	5,360	1906.....	134,334	93,630
1891.....	6,259	4,273	1907 (9 mos.).....	88,919	67,573
1892.....	6,132	4,241	1908.....	129,379	99,611
1893.....	6,879	4,917	1909.....	153,934	106,263
1894.....	6,766	4,907	1910. Duty 20 per cent. ...	191,537	116,964
1895.....	12,008	5,743			

SAND-LIME BRICK.

Returns were received from 13 firms producing sand-lime brick during 1910, showing total sales of 44,593,541, valued at \$371,857, or an average value of \$8.34 per thousand. The total sales by nine firms in 1909 were 27,052,864 brick valued at \$201,650, or an average of \$7.45 per thousand.

The number of men employed during 1910 was 267 and wages paid \$125,594. Annual statistics of production since 1907 are shown below:—

Annual Production of Sand-Lime Brick.

Calendar Year.	Number.	Value.	Per M.
		\$	\$ cts.
1907.....	16,492,971	167,795	10 17
1908.....	17,288,260	152,856	8 84
1909.....	27,052,864	201,650	7 45
1910.....	44,593,541	371,857	8 34

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

- The Schultz Bros. Co., Ltd., Brantford, Ont.
- Jno. Mann Brick Co., Ltd., 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.
- Canada Sand Lime Pressed Brick Co., Toronto, Ont.
- The Port Arthur Sand Lime Brick Co., Port Arthur, Ont.
- The Brandon Sandstone Co., Ltd., Brandon, Man.
- Manitoba Pressed Brick Co., Ltd., Winnipeg, Man.
- Winnipeg (Eli) Sandstone Brick Co., Winnipeg, Man.
- Interocean Pressed Brick Co., Regina, Sask.
- Calgary Silicate Pressed Brick Co., Calgary, Alta.
- Victoria-Vancouver Lime and Brick Co., Victoria, B.C.

SAND AND GRAVEL.

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	1910.....	624,824	407,974

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	1910.....	151,982	155,012

SLATE.

The production of slate has shown little variation for a number of years, the output having been obtained entirely from the New Rockland slate quarries of Richmond county, Quebec, which are operated under lease by Messrs. Frazer and Davies.

The production in 1910 was reported as 3,959 squares, valued at \$18,492; as compared with 4,000 squares, valued at \$19,000, in 1909.

Statistics of annual production since 1886 are shown herewith:—

Annual Production of Slate.

Calendar Year.	Tons.	Value.	Calendar Year.	Squares	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	118,169	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.....		58,900	1907.....	4,335	20,056
1896.....		53,370	1908.....	2,950	13,496
1897.....		42,800	1909.....	4,000	19,000
			1910.....	3,959	18,492

No exports of slate are reported for 1910. The imports, however, are quite large and in value aggregate nearly eight times the domestic production.

The total value of the imports during the calendar year 1910 was \$142,285, comprising: roofing slate, \$67,063; school writing slate, \$31,397; slate pencils, \$6,948; other slates and manufactures of slate, \$36,877. The imports of roofing slate, school writing slate, and manufactures of slates N.O.P. are chiefly from the United States. Some roofing slate is also imported from Great Britain, while slate pencils come principally from Germany and the United States.

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

Imports of Slate during the Years 1909 and 1910.

Slate and Manufactures of	12 months ending March, 1910.	12 months ending Dec., 1909.	12 months. ending Dec., 1910.
	\$	\$	\$
Roofing slate.....	72,842	71,914	67,063
School writing slate.....	31,252	34,085	31,397
Slate pencils.....	6,096	6,154	6,948
Slate of all kinds and manufactures of.....	26,211	23,068	36,877
	136,401	135,221	142,285

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
			1910.....	Nil.	Nil.

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.....	21,515	1907 (9 mos.).....	95,520
1888.....	23,151	1898.....	24,907	1908.....	131,069
1889.....	41,370	1899.....	33,100	1909.....	124,065
				1910.....	136,401

Mr. J. A. Dresser of the Geological Survey describes¹ the slate of the Eastern Townships, Province of Quebec, as follows:—

“Slate of good quality both for roofing and other purposes occurs in several places in the Ordovician and Cambrian strata adjacent to the serpentine belt. In a number of these places quarries were opened between thirty and fifty years ago, but most of them have long since been closed from one cause or another, principally, it would appear, from an insufficient market at the time they were operated.

“At the present time these conditions have apparently changed for the better, and the slate deposits might properly receive renewed attention.

“*Ordovician Slates.*—The Ordovician slates occur in the argillaceous parts of the Farnham (lower Trenton) formation. They are dark, or bluish grey in colour, and have an excellent cleavage, nearly vertical, which may be at any angle to the bedding planes.

“These slates have been quarried at Danville, Corris, Brompton, Melbourne, and New Rockland. The last mentioned quarry is the only one at present in operation in eastern Canada. The slate produced is of excellent quality.

“The quarries at Corris, Melbourne, and New Rockland are situated so near the contact of the slates with an intrusive sheet of peridotite and serpentine as to be within the zone of alteration thus produced. The nearness to the serpentine is both a favourable and unfavourable factor. Outside of the zone of contact metamorphism the slate is soft, and lacks the strength that makes it especially valuable when slightly hardened by the intrusion; but within the contact zone, quartz veins, or flints become more numerous as the serpentine is approached, and thus tend to lessen the value of the slate. Very near the contact, too, the slate becomes a fine hornstone, too hard to be well worked, and it is then said to be sharp. The part of the rock of greatest value seems, therefore, to be near enough to the contact with the intrusive rock to secure strong slate, and far enough from it that the spaces between the flints are so large as to be worked advantageously.

“The other features that injure the slate are oblique cleavages called slants, and shattered bands known as posts. These depend on mechanical deformation, and may be connected with the intrusion of the serpentine. At the Melbourne quarry, dykes of pyroxenite strike off from the intrusive rocks for 40 feet into the slate.

“In its original composition, the rock may have largely been made up of good material for slate, except near the bottom of the slate beds where the basal conglomerate is found. Slabs taken from the lowest level at the north side of the main pit at New Rockland show pebbles of Cambrian sandstone and quartzite, and indicate that the bottom of the slate has there been reached.

¹ Summary report of the Geological Survey Branch, Department of Mines, 1910, p. 217.

"The New Rockland quarry has been operated almost continually since 1868. During the past eight years it has been worked by Messrs. Frazer and Davies under a lease from the New Rockland Slate Company. Some 35 men are employed, two steam drills, and three derricks are in operation, steam and water-power are used. Only roofing slate is now made.

"The quarrying is done in open pits, the rocks being cut down in benches. The rock is first assorted in the pit, and that suitable for splitting is hoisted and sent to the splitting sheds. There, it is cut, split, and trimmed to the sizes required, or to which it is best adapted. The usual thickness is $\frac{3}{8}$ inch, and the superficial sizes vary from 12 inches by 24 inches to 6 inches by 12 inches. While working on higher levels in a deep pit, the waste rock is allowed to accumulate to some depth in the bottom in order to lessen the loss from breakage of good slate by falling into the pit before blasting. During winter it is an advantage to have as little of the walls exposed to the frost as possible, since the slate, once frozen, becomes valueless if it is not split when frozen. The waste rock is, therefore, removed somewhat irregularly.

"*Cambrian Slates.*—The Cambrian slates are green and reddish or purple in colour, and where there is a mingling of these colours a handsome mottled slate results. The green colour, in all cases seen, is that known as the ever or unfading green. The slates of this formation, as far as known, have not been influenced by the action of igneous rocks. They split less smoothly than the dark slates just described, having a coarser texture, and are frequently not as strong.

"The quarries that have been opened usually show large bodies of slate free from quartz veins, and sometimes having different colours in different parts of the same pit. A few buildings in the district have roofs on which these slates are said to have lain for 50 years without change of colour or serious breakage.

"Very similar slates are quarried at Fairhaven, Vermont, and are the principal variety produced in the large slate industry of that State. The manner of dressing the slate there is different from that at New Rockland, probably because of different market conditions. At New Rockland thin slates $\frac{3}{8}$ inch are generally used, while at Fairhaven the purple, green, and mottled slates are split in thickness ranging from $\frac{1}{2}$ inch to 1 $\frac{1}{4}$ inches. The price varies with the thickness, an increase of about \$2 per square being allowed for each additional $\frac{1}{4}$ inch. Besides being cut to proper sizes, and split to the required thickness, the slates are bored for nail or bolt holes, and the holes are counter sunk, for which an extra charge is made. These heavy slates are said to be used principally for roofing on large steel buildings of the class now being built in the larger cities.

"Slate of this quality has been opened at several places in and near this district. Green slate occurs three-fourths of a mile south of New Rockland quarry; purple and green at the Kingsey quarry, 6 miles north of Richmond, also in Brompton, southeast of Mud pond, and at other places in the Eastern Townships.

"Roofing slate is bought and sold by the square, that is sufficient slate to cover 100 square feet after allowance has been made for all overlapping. A square of slate $\frac{1}{4}$ inch in thickness weighs upwards of 1,000 pounds; hence the thicker grades weigh a ton, or, a ton and a half per square. The present prices in New England for slate of good quality range from \$6 to \$12 per square, according to thickness. In Canada most of the slate is made into the lighter or thinner grades, for which the prices are a little below those obtained in New England."

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 were 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 production of stone in 1910, according to returns received, was \$3,650,019, as compared with a value of \$3,127,135 in 1909; showing an increased production of \$522,884 or 16.72 per cent.

In 1908 the total value of the production was estimated at \$2,378,318. The number of active firms reporting in 1910 was 166; the total number of men employed 5,105; and total wages paid \$2,225,791. 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 1910 production, limestone constituted \$2,249,576 or 61.7 per cent; granite, \$739,516 or 20.3 per cent; sandstone, \$502,148 or 13.7 per cent, and marble, \$158,779 or 4.3 per cent.

Stone was used for building purposes to the value of \$1,504,001 or 41.2 per cent of the total; monumental and ornamental stone, a value of \$147,421 or 4 per cent; curb paving and flagstone, \$239,668 or 6.6 per cent; rubble, \$352,000 or 9.7 per cent; crushed stone, \$975,379 or 26.7 per cent, and furnace flux, 896,757 tons, valued at \$431,550, or 11.8 per cent.

By provinces, Quebec shows the largest output, having a value of \$1,469,086 or 40.3 per cent of the total, being made up of limestone to the value of \$962,429 granite valued at \$356,257, and marble, \$151,000. Ontario again takes second place with a production of \$898,788, or 24.6 per cent of the total: of which limestone is credited with \$722,763; granite, \$109,678; sandstone, \$62,247, and marble, \$4,100. British Columbia ranked third in order of importance with a total of \$422,392, including: granite, \$244,767; sandstone, \$130,825; limestone, \$43,121, and marble, \$3,679. The production in Manitoba was valued at \$331,672, made up of limestone, \$328,029, and granite, \$3,643. Alberta takes fifth place in 1910 with a total production of \$240,858, all sandstone. The Nova Scotia production was reported as \$227,635, comprising: limestone, \$192,919; granite, \$18,291, and sandstone, \$16,425. New Brunswick is credited with \$58,988, made up chiefly of sandstone and granite.

Production of Stone by Provinces, 1910.

Province.	Granite.	Limestone.	Marble.	Sandstone.	Total.	%
	\$	\$	\$	\$	\$	
Nova Scotia.....	18,291	192,919		16,425	227,635	6.2
New Brunswick.....	6,880	315		51,793	58,988	1.6
Quebec.....	356,257	962,429	151,000		1,469,686	40.3
Ontario.....	109,678	722,763	4,100	62,247	898,788	24.6
Manitoba.....	3,643	328,029			331,672	9.1
Alberta.....				240,858	240,858	6.6
British Columbia.....	244,767	43,121	3,679	130,825	422,392	11.6
Totals.....	739,516	2,249,576	158,779	502,148	3,650,019	100.0
Per cent.....	20.3	61.7	4.3	13.7	100.0	

Value of Stone Sold for Various Purposes in 1910.

Kind.	Building.	Ornamental and Monumental.	Paving and Curb-stone.	Rubble.	Crushed.	Furnace Flux.	Total.
	\$	\$	\$	\$	\$	\$	\$
Granite.....	268,197	74,576	79,501	46,639	270,603		739,516
Limestone.....	623,149	72,580	125,637	295,168	701,556	431,486	2,249,576
Marble.....	158,700			15		64	158,779
Sandstone.....	453,055	265	34,530	10,178	3,220		502,148
Totals.....	1,504,001	147,421	239,668	352,000	975,379	431,550	3,650,019

Production of Stone by Provinces and for Purposes used, 1910.

Province.	Building.	Ornamental and Monumental.	Paving and Curb-stone.	Rubble.	Crushed.	Furnace Flux.	Total.
	\$	\$	\$	\$	\$	\$	\$
Nova Scotia.....	18,610	11,156	4,600		350	192,919	227,635
New Brunswick.....	40,047	6,880		2,761	200	100	58,988
Quebec.....	707,890	116,456	165,730	143,930	329,627	6,053	1,469,686
Ontario.....	83,602	0,929	65,588	135,550	414,826	189,293	898,788
Manitoba.....	215,378			53,302	62,992		331,672
Alberta.....	234,487			6,371			240,858
British Columbia.....	194,987	3,000	3,750	10,086	167,384	43,185	422,392
Totals.....	1,504,001	147,421	239,668	352,000	975,379	431,550	3,650,019
Per cent.....	41.2	4.0	6.6	9.7	26.7	11.8	100.0

Production of Stone by Provinces, 1909.

Province.	Granite.	Limestone.	Marble.	Sandstone.	Total.	%
	\$	\$	\$	\$	\$	
Nova Scotia.....	5,832	161,922		21,850	189,604	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	100.0
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

Production of Stone by Provinces and for Purposes used, 1909.

Province.	Building.	Ornamental and Monumental.	Paving and Curbstone.	Rubble.	Crushed.	Furnace Flux.	Total.
	\$	\$	\$	\$	\$	\$	\$
Nova Scotia.....	16,043	4,018	2,846	6,000	800	159,897	189,604
New Brunswick.....	29,192	7,038	450	5,500	.....	.....	42,180
Quebec.....	554,722	230,095	210,426	94,241	259,615	10,250	1,359,349
Ontario.....	99,200	12,687	54,443	82,449	303,652	196,208	748,639
Manitoba.....	179,605	45,000	62	49,312	57,920	.....	331,899
Alberta.....	87,450	.....	.....	2,933	.....	.....	90,383
British Columbia.....	204,338	7,500	11,000	62,685	42,300	37,258	365,081
Totals.....	1,170,550	306,338	279,227	303,120	664,287	403,613	3,127,135
Per cent.....	37.4	9.8	8.9	9.7	21.3	12.9	100.

Exports and Imports.—The exports of stone are classified simply as wrought and unwrought; the total value of the exports in 1910 was \$27,471 as compared with \$59,370 in 1909 and \$58,005 in 1908.

The annual exports 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	32,897	1906.....	23,097	4,675
1897.....	9,415	42,034	1907.....	4,233	3,087
1898.....	2,526	65,370	1908.....	5,194	42,811
1899.....	5,092	101,931	1909.....	33,598	25,772
			1910.....	5,352	22,119

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 1910 was \$845,123, as compared with a value in 1909 of \$683,801; showing an increase of \$161,322, or 23.6 per cent. Of the total imports during 1910, \$311,595 in value was classed as building stone, and \$192,212 as granite sawn and manufactures of; \$74,100 as paving blocks, and \$267,215 as marble and manufactures of.

During 1909 the imports of building stone were \$280,557; granite, \$162,742; paving blocks, \$58,355, and marble, \$182,147.

The imports during both years 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 also from Italy and other countries. The total value of the imports from the United States in 1910 was \$640,084; from Great Britain, \$160,664; from Italy, \$31,314 and from other countries, \$13,061.

Total Imports of Stone during the Calendar Years 1909 and 1910.

Imports.	1909.		1910.	
	Tons.	Value.	Tons.	Value.
		\$		\$
Building stone, rough (1).....	21,746	102,470	27,658	125,531
" dressed (2).....	35,910	178,087	33,996	186,064
Granite, sawn only.....	307	2,380	789	3,287
" manufactures of.....		129,918		154,798
Paving blocks.....		58,355		74,100
Manufactures of stone, N.O.P.....		30,444		34,128
Marble and manufactures of—				
Marble, sawn or sand rubbed, not polished.....		118,095		154,153
" rough, not hammered or chiselled.....		8,414		18,368
" manufactures of, N.O.P.....		55,638		94,694
		683,801		845,123

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

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

Imports of Stone, showing Country of Origin, Calendar Year 1910.

Imports.	Great Britain.		United States.		Italy.	Other Countries.
	Tons.	Value.	Tons.	Value.	Value.	Value.
		\$		\$	\$	\$
Building stone, rough (1).....	265	1,810	26,951	122,531		*1,190
" dressed (2).....	42	153	33,954	185,911		
Granite, sawn only.....	7	37	782	3,250		
" manufactures of.....		149,958		4,762		78
Paving blocks.....		0		73,033		1,067
Manufactures of stone, N.O.P.....		4,340		27,548		2,240
Marble and manufactures of—						
Marble, sawn or sand rubbed, not polished.....		299		122,168		372
" rough, not hammered or chiselled.....				12,939	31,314	5,429
" manufactures of, N.O.P.....		4,067		87,942		2,685
		160,664		640,084	31,314	13,061

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

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

(*) Represents value of 442 tons.

Imports of Stone, Fiscal Years 1909 and 1910.

Imports.	1909.		1910.	
	Tons.	Value.	Tons.	Value.
Building stone, rough (1).....	14,011	\$ 63,984	23,928	\$ 110,997
" dressed (2).....	16,841	72,961	36,884	184,620
Granite, sawn only.....	302	2,756	280	2,146
" manufactures of.....		123,155		130,697
Paving blocks.....		42,420		58,247
Manufactures of stone, N.O.P.....		25,618		32,372
Marble and manufactures of—				
Marble, sawn or sand rubbed, not polished.....		108,522		128,897
" rough, not hammered or chiselled.....		9,138		1,398
" manufactures of, N.O.P.....		83,268		54,503
		531,822		703,877

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

(2) Flagstone; 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.....	22,324	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	78,907	136,779	176,450	Nil	450,594
1908.....	80,950	90,740	192,248	287,587	Nil	651,525
1909.....	63,984	72,961	1 3,949	200,928	Nil	531,822
1910.....	110,997	184,620	223,462	184,798	Nil	703,877

GRANITE.

The production of granite and trap-rock in 1910, according to returns from 33 active firms reporting, was valued at \$739,516; as compared with a production by 29 firms valued at \$454,824 in 1909; showing an increase of \$284,692, or 63 per cent.

There was an increased production of granite for building, monumental, and ornamental purposes, a very large increase in the production of crushed granite, and a falling off in values of granite sold for curbing, paving, and rubble.

Quebec province was the largest producer, the value of sales in 1910 being \$356,257, as compared with \$257,096 in 1909. The value of sales in British Columbia in 1910 was \$244,767, as compared with \$134,310 in 1909; while Ontario produced a value of \$109,678 in 1910, as compared with \$42,700 in 1909.

New Brunswick was at one time a large producer of granite, the quarries in the vicinity of St. George being extensively operated. There is still a considerable industry at St. George, although much less than formerly, in the manufacture of granite, the total value of the dressed stone produced in 1910 being \$70,000. The rough stone, however, is now obtained largely from other quarries including Spoon island, N.B., Redbeach, Maine, and Mt. Johnston, Que.

Statistics of the production by provinces for 1910 and 1909, showing the purposes 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

Value of Granite Production by Provinces, 1910.

Province.	Building.	Monumental or Ornamental	Curb, or Paving.	Rubble.	Crushed.	Total.
	\$	\$	\$	\$	\$	\$
Nova Scotia.....	2,600	11,091	4,600			18,291
New Brunswick.....		6,880				6,880
Quebec.....	202,435	53,405	40,831	3,055	56,531	356,257
Ontario.....	1,100	200	30,320	33,513	44,545	109,678
Manitoba.....					3,643	3,643
British Columbia.....	62,062	3,000	3,750	10,071	165,884	244,767
Total.....	268,197	74,576	79,501	46,639	270,603	739,516

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
			1910.....		739,516

LIMESTONE.

The statistics given herewith do not include the value of the stone burned into lime by the quarry operators nor that of the stone used in the manufacture of cement, a record of lime and cement production being separately given. With these exceptions the total value of the production of limestone in Canada in 1910 was \$2,249,576, as compared with a value of \$2,139,691 in 1909, or an increase of about 5 per cent.

There was a decrease in the production of limestone for building and ornamental purposes and for curbstone and paving, but an increased production of crushed stone, rubble, and furnace flux.

The production during 1910 of limestone for building purposes was valued at \$695,729, as against \$761,821 in 1909; the value of crushed stone in 1910 was \$701,556, as against \$609,349 in the previous year. Curbstone and paving blocks were produced to the value of \$125,637 in 1910, as compared with \$154,490 in 1909. The value of rubble in 1910 was \$295,168, as against \$210,418 in 1909. The production of furnace flux in 1910 was 896,677 tons, valued at \$431,486, as compared with 842,232 tons, valued at \$403,613, in 1909.

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

Value of Limestone Production by Provinces, 1910.

Province.	Building and Ornamental.	Crushed.	Curbstone and Paving.	Rubble.	Furnace Flux.		Total.
					Tons.	\$	
	\$	\$	\$	\$		\$	\$
Nova Scotia.....					385,838	192,919	192,919
New Brunswick.....	15	200			100	100	315
Quebec.....	417,506	273,096	124,899	140,875	9,573	6,053	962,429
Ontario.....	62,830	368,911	738	100,991	406,394	189,293	722,763
Manitoba.....	215,378	59,349		53,302			328,029
British Columbia.....					94,772	43,121	43,121
Total.....	695,729	701,556	125,637	295,168	896,677	431,486	2,249,576

The Province of Quebec was the largest producer of limestone, having a total output valued at \$962,429: of which \$417,506 was building and ornamental stone; \$273,096 crushed stone; \$140,875 in rubble; \$124,899 curbstone and paving, and \$6,053 furnace flux.

The production of all classes was slightly less than that reported for 1909. The record is probably an underestimate as there are one or two large firms that neglected to make returns, while there is a class of small operators from whom it is particularly difficult to obtain satisfactory information. In many cases they do not seem to have kept any record of their shipments. Ontario shows an increased production of limestone, the value of output in 1910 being \$722,763: of which \$368,911 was crushed stone; \$189,293 flux; \$100,991 rubble, and \$62,830 building stone. The production in Manitoba was valued at \$328,029, and consists chiefly of building stone with some crushed stone and rubble. The production of limestone in Nova Scotia and British Columbia was used entirely for furnace flux.

MARBLE.

From 1886 to 1896 there was a small production of marble, aggregating, however, only \$4,167 in value for the eleven years. During the next eleven years—1897 to 1907—there is no record of any production. But the opening up of the quarries at Philipsburg, Que., by the Missisquoi Marble Company, Limited., together with the development of quarries in Ontario and British Columbia, has resulted in a considerable production of marble during the past three years. The total value of the production in 1910 was returned as \$158,779, as compared with \$158,441 in 1909 and \$125,000 in 1908. As already shown in a previous table the imports of marble during 1910 were valued at \$267,215, and in 1909, \$182,147. Marble quarries were operated during 1910 at Philipsburg, Que., Darling and Hungerford townships in Ontario, and Marblehead, British Columbia.

The value of the Quebec production was \$151,000, as compared with \$130,000 in 1909; Ontario \$4,100 as against \$3,441 in 1909; and British Columbia \$3,679 as compared with \$25,000 in 1909. With the exception of the Philipsburg quarries the operations were practically confined to the development of quarries.

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.....	3	980	1896.....	224	2,405
1890.....	780	10,776	1897 to 1907 inclusive.....	Nil	Nil
1891.....	240	1,752	1908.....		125,000
1892.....	340	3,000	1909.....		158,441
			1910.....		158,779

SANDSTONE.

There was a considerable increase in the production of sandstone in 1910, the value of output being \$502,148, as compared with \$374,179 in 1909. The greater part of the sandstone quarried is used for building purposes. A small quantity is used as rubble and as crushed stone, while in Ontario sandstone paving blocks are made.

Of the production in 1910 building and ornamental sandstone was sold to the value of \$454,220, or 90.5 per cent of the total sandstone sales. This amount comprised \$118,364 in value of rough stone and \$335,856 in dressed stone as sold by the quarry operator. The production in 1909 of building and ornamental stone was valued at \$326,206, comprising \$103,859 in rough stone and \$222,347 in dressed stone.

Statistics of production in 1909 and 1910 are shown in the next two tables. There is no complete record of the sandstone production throughout Canada in previous years.

Value of Sandstone Production by Provinces, 1910.

Province.	Building and Ornamental.	Crushed.	Paving.	Rubble.	Total.
	\$	\$	\$	\$	\$
Nova Scotia.....	16,075	350			16,425
New Brunswick.....	49,032			2,761	51,793
Ontario.....	25,301	1,370	34,530	1,046	62,247
Alberta.....	234,487			6,371	240,858
British Columbia.....	129,325	1,500			130,825
Total.....	454,220	3,220	34,530	10,178	502,148

Value of Sandstone Production by Provinces, 1909.

Province.	Building and Ornamental.	Crushed.	Paving.	Rubble.	Total.
	\$	\$	\$	\$	\$
Nova Scotia.....	15,050	800		6,000	21,850
New Brunswick.....	25,784			4,825	30,609
Ontario.....	29,584	2,563	17,774	12,903	62,824
Alberta.....	87,450			2,933	90,383
British Columbia.....	168,338			175	168,513
Total.....	326,206	3,363	17,774	6,836	374,179

