INTERIM REPORT

STATISTICAL EXAMINATION

OF

CERTAIN GENERAL CONDITIONS OF TRANSPORTATION BEARING ON THE ECONOMIC PROBLEM OF THE PROPOSED

GEORGIAN BAY CANAL

BY

W. SANFORD EVANS

Chairman, Georgian Bay Canal Commission.

1916

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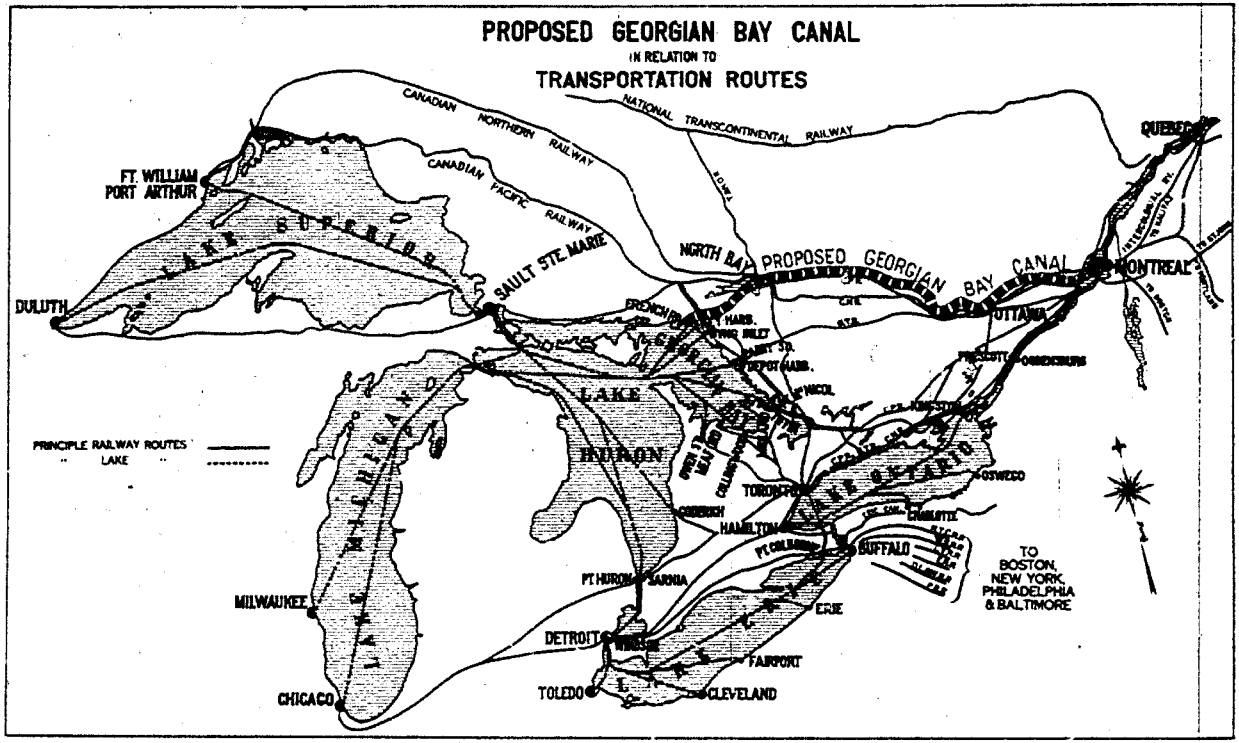
PROPOSED GEORGIAN BAY CANAL
IN RELATION TO
TRANSPORTATION ROUTES
CANADIAN NORTHERN RAILWAY
NATIONAL TRANSCONTINENTAL RAILWAY
CANADIAN PACIFIC RAILWAY
FT. WILLIAM
PORT ARTHUR
LAKE SUPERIOR
SAULT STE. MARIE
DULUTH
NORTH BAY
PROPOSED GEORGIAN BAY CANAL
QUEBEC
MONTREAL
OTTAWA
LAKE HURON
LAKE ONTARIO
TORONTO
HAMILTON
BUFFALO
OSWEGO
ROCHESTER
ERIE
PT. HURON
SARNIA
DETROIT
TOLEDO
CLEVELAND
FAIRPORT
MILWAUKEE
CHICAGO
PRINCIPLE RAILWAY ROUTES
LAKE
TO BOSTON, NEW YORK, PHILADELPHIA & BALTIMORE

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COMMISSION

Appointing commissioners to inquire into and report upon the commercial feasibility and national advantages to be derived from the proposed construction of a deep inland waterway from the Georgian bay, Ontario, to the port of Montreal in the province of Quebec.

Dated 18th March, 1914.
Recorded 1st April, 1914.
Lib. 212, Fol. 67.

THOMAS MULVEY,
Deputy Registrar General of Canada.

CANADA.

GEORGE THE FIFTH, by the Grace of God, of the United Kingdom of Great Britain and Ireland, and of the British Dominions beyond the Seas, KING, Defender of the Faith, Emperor of India.

To all to whom these presents shall come, or whom the same may in anywise concern,

GREETING,—

WHEREAS in and by an order of His Royal Highness our Governor General in Council, bearing date the eighteenth day of March, in the year of Our Lord One Thousand Nine Hundred and Fourteen, provision has been made for a careful and thorough inquiry by our commissioners therein and hereinafter named in respect of the proposed construction of a deep inland waterway, providing for accommodation for the large lake carriers from the Georgian bay, in the province of Ontario, to the port of Montreal, in the province of Quebec, from the point of view of the commercial feasibility and national advantages to be derived from such a waterway, and in that connection to inquire into and consider the following questions, namely:—

1. A study of the transportation problem in relation to the proposed waterway; to what extent can it help in developing the resources of the country.

2. The advantages of a large waterway from the lakes to the seaboard, open to the largest type of lake carriers; the feasibility of these carriers navigating such waterway and the influence on the rate regulation of transport, especially upon cheaper commodities which the country produces.

3. The competition of the waterway with the railways; effect on railways, by creating new industries, on account of cheap transportation of low grade freight that cannot be handled by rail, causing an expansion in industries, an increase to the population and a demand for a higher class of freight seeking transportation by rail.

4. The probable volume of traffic available on account of the natural advantages of such waterway, which would be the shortest and deepest water route from the head of the Great Lakes to the seaboard for the largest lake vessels and the probable length of the open navigation season through this waterway.

5. Traffic of the Great Lakes; how it reaches the seaboard. The percentage of Canadian traffic handled through United States ports, and causes for this diversion.

6. Lake transportation; rates that obtain; lake and rail rates as against all rail rates; also a comparison with an all water route rate; also a comparison between the proposed Georgian Bay Ship Canal route and all the competing routes in existence and in course of construction and their capacity; comparative cost of transportation per ton mile, rail, lake and rail, and all water.

7. A comparison of the volume of traffic that may be handled by water as against the rail routes within the same period. Possible economic advantages of such a waterway.

8. The position of the Northwest; Fort William and Port Arthur being the objective point of all lines running through the wheat belt. How the situation at the head of the lakes would be ameliorated; would an all water route from Fort William to the seaboard, for largest lake vessels, be the natural complement of the present water and rail routes?

9. The position of the existing and projected Gulf Lines via Galveston, what their influence would be regarding diversion of traffic from the lakes and St. Lawrence route. The effect upon the movement of the traffic by the opening of the Hudson Bay, and Pacific and Panama routes.

10. The conditions that exist at the Atlantic seaboard, Canadian and United States, as to handling traffic, and as to ocean and insurance rates.

11. Interprovincial trade. The facilitating of trade between the provinces. The Northwest to supply Ontario, Quebec, and the Maritime Provinces with wheat at a cheaper transportation rate; Ontario and Quebec to supply in return the product of their manufactures, whilst it will perhaps be possible for Nova Scotia to supply coal to some Ontario points at a cheaper freight rate than it now costs to bring it from the United States, effecting a great saving to the country.

12. The iron industry and other mineral resources; the deep waterway as a factor in their development.

13. Pulp industry and the possibility of development.

14. The tendency to manufacture at the base of supply; the possibilities along the route of the waterway where raw material that cannot be transported by rail at a low rate is available. The easy development of large water powers at dams, for manufacturing purposes.

15. New territory opened in the Northwest and the requirements to move the grain crop in the future to open market; the cost of transporting wheat from important centres in the Northwest to head of lakes.

16. Storage at the head of the lakes and the seaboard; extent of terminals required.

17. Markets, general statistics, synopsis of history of deep canals; their trade development.

18. Generally speaking, the commercial feasibility of the proposed waterway.

Now Know Ye that by and with the advice of our Privy Council for Canada, we do by these presents nominate, constitute and appoint William Sanford Evans, of the city of Winnipeg, in the province of Manitoba, financial agent; Frank Stephen Meighen, gentleman, and Edouard Gohier, merchant, both of the city of Montreal, in the province of Quebec, to be our commissioners to conduct such inquiry; to have, hold, exercise and enjoy the said office, place and trust unto the said William Sanford Evans, Frank Stephen Meighen and Edouard Gohier, together with the rights, powers, privileges and emoluments unto the said office, place and trust of right and by law appertaining during pleasure,—And we do further nominate, constitute and appoint the said William Sanford Evans to be the Chairman of the said Commission.

And we do hereby under the authority of the revised Statute respecting inquiries concerning public matters confer upon our said Commissioners the power of summoning before them any witnesses and of requiring them to give evidence on oath or on solemn affirmation if they are persons entitled to affirm in civil matters, and orally or in writing, and to produce such documents and things as our said Commissioners shall deem requisite to the full investigation of the matters into which they are hereby appointed to examine. And we do hereby further authorize the said Commissioners to employ such technical and professional assistants as they may deem necessary in connection with the inquiry. And we do hereby require and direct our said Commissioners to report to His Royal Highness the Governor General in Council the result of their investigation together with the evidence, if any, taken before them and any opinion they may see fit to express thereon.

In testimony whereof, we have caused these our letters to be made patent and the great seal of Canada to be hereunto affixed. Witness: Our Most Dear and Entirely Beloved Uncle and Most Faithful Counsellor, Field Marshal His Royal Highness Prince Arthur William Patrick Albert, Duke of Connaught and of Strathearn; Earl of Sussex (in the Peerage of the United Kingdom); Prince of the United Kingdom of Great Britain and Ireland; Duke of Saxony, Prince of Saxe-Coboung and Gotha; Knight of Our Most Noble Order of the Garter; Knight of our Most Ancient and Most Noble Order of the Thistle; Knight of Our Most Illustrious Order of St. Patrick; One of our Most Honourable Privy Council; Great Master of Our Most Honourable Order of the Bath; Knight Grand Commander of Our Most Exalted Order of the Star of India; Knight Grand Cross of Our Most Distinguished Order of St. Michael and St. George; Knight Grand Commander of Our Most Eminent Order of the Indian Empire; Knight Grand Cross of Our Royal Victorian Order; Our Personal Aide-de-Camp; Governor General and Commander-in-Chief of our Dominion of Canada.

At our Government House, in Our City of Ottawa, this eighteenth day of March, in the year of Our Lord One thousand nine hundred and fourteen and in the fourth year of Our reign.

By Command,

THOMAS MULVEY,

Under-Secretary of State.

Honourable ROBERT ROGERS,

Minister of Public Works,

Ottawa, Canada.

SIR,—Pending the completion of the statistical survey of the principal facts and conditions entering into the transportation problems referred to the Georgian Bay Canal Commission, which it was arranged should be undertaken as preparatory to the work of the Commission, I beg to submit the following Interim Report covering such matters as have already been submitted to examination.

Yours respectfully,

W. SANFORD EVANS.

OTTAWA, 1910.

INTERIM REPORT, GEORGIAN BAY CANAL COMMISSION.

By W. Sanford Evans, *Chairman, Georgian Bay Canal Commission, 1916.*

INTRODUCTORY STATEMENT.

Under the authority of Parliament, a survey and investigation of the practicability and probable cost of the long-mooted proposition to construct a deep waterway from Georgian bay to the harbour of Montreal, by way of the French and Ottawa rivers, was initiated in 1904 under a board of engineers. In 1909 this board submitted a report (Georgian Bay Ship Canal Report upon Survey, with Plans and Estimates of Cost, 1908), the plans providing for a waterway 22 feet deep, with a length of 440 miles, in which there would be 28 miles of canal excavation, 66 miles of channel dredging, and 346 miles of river and lake; with 27 locks of a minimum length of 650 feet, with 65 feet clear width and 22 feet clear depth, the lift ranging from 5 feet to 50 feet; and with a minimum water supply in the summit basin, capable of being increased, which would permit of 20 lockages per day throughout a season of about 210 days. The cost, originally placed at $100,000,000, was, in view of increases in the cost of materials, subsequently estimated at $125,000,000.

In 1914 a Royal Commission was issued, in the terms already set forth, for a report upon the "commercial feasibility" of such a canal, and in general upon many elements of the transportation problem in Canada. The engineers had reported that the canal was practicable, but the report of the Georgian Bay Canal Commission was to be upon the question whether or not it would pay Canada to spend $125,000,000 upon this public work.

A reasonable judgment upon the economic feasibility of any proposition must be based upon a careful study of facts and upon an equally careful estimate of tendencies and possibilities of development. As many of the conditions which constitute the economic factors of a problem such as this have not previously been statistically studied in Canada, and are not adequately set forth in any existing compilations, it was considered desirable to collect and arrange certain important classes of facts as preliminary to the consideration of any conclusions by the commission, and even as preliminary to the holding of public hearings. An arrangement was accordingly made by which the chairman of the commission undertook this preparatory statistical survey, and this interim report, sets forth some of the facts so far examined. It is not a report on conclusions, but rather a general introductory statement of part of the case to be argued, and takes the form of a summary statement, illustrated by diagrams, and an appendix containing tables of figures. It is submitted at this stage for constructive criticism and for suggestions as to other essential matters to be taken into consideration so that the case may be made complete. As soon as the most important fundamental facts are available and within the knowledge of those interested, argument can profitably be heard, and in due time, and after full public hearings, the Georgian Bay Canal Commission will present its report.

Scope of this report.—Great public works, such as railways and canals, may be undertaken for political, military, or economic reasons. The terms of Confederation imposed on the Dominion Government a political obligation for certain works of this kind. Military purposes have led to very large expenditures on transportation

facilities in many countries, and perhaps neither military nor the higher political reasons should be overlooked in conection with any public work. The present question, however, is whether there is an economic reason for a Georgian Bay canal.

A canal is constructed to carry traffic and from the national standpoint might have economic justification:—

(1) If existing traffic facilities are congested, or in danger of congestion within a period of time for which provision should now be considered, and if the proposed canal offers adequate and satisfactory additional facilities.

(2) Even if actual congestion is not threatened, then if a sufficiently great volume of traffic is likely to be affected by the building of the canal so that the decreased cost or the increased convenience will bear a remunerative relation to the capital invested. Under this heading there would be two inquiries:—

(*a*) As to the volume of traffic that would probably use the canal itself;

(*b*) As to the volume of traffic likely to be affected by the competitive influence of the canal, through the effect of the new route on the rates and conveniences of other routes.

(3) If its construction would probably promote the development of traffic to a greater extent or at a more rapid rate than an alternative improvement in facilities, and to a degree commensurate with the cost.

(4) If in connection with its construction collateral assets or benefits might be created, of which water-powers may be taken as one example, which, properly appraised, might so supplement the traffic advantages as to make the total national return appear profitable.

This interim report does not deal with possible collateral values created by the building of the proposed Georgian Bay canal, which must later be inquired into, but solely with the problem of traffic.

Again, this report does not deal with the important question of local traffic, but only with the problem of through traffic. A canal might enable the population along its banks to receive and ship goods on better terms than at present and might lead to a marked increase of population in that district and to the establishment of new industries; and it might also further the development of such natural resources as that district may contain. To the extent to which it is a net addition to the sum of national well-being, and is not accompanied by a corresponding loss elsewhere or is not only a transfer from one point to another, an economic advantage to a section of the population or to a limited district may be counted a national advantage. But it must not cost too much and the burden of the cost must be properly placed. The natural resources of the territory tributary to the proposed canal should be carefully investigated, and an estimate made of all probable local gains. In this report, however, only facts and conditions bearing on the general traffic problem of Canada are under examination.

The proposed Georgian Bay canal would form a new channel in the St. Lawrence and Great Lakes water-route from the Atlantic ocean to the heart of the North American continent. Over certain of the existing channels of this greatest of inland waterways there now passes an enormous volume of traffic. Some of this is Canadian traffic and some United States traffic. Some of the vessels are of Canadian or British registry, and some of United States registry. These vessels freely use all canals and improvements in the waterways, without distinction because of the nationality of the vessel or the national ownership of the canals or deepened channels, and, within the restrictions of the coasting laws, some traffic of Canadian origin is carried in United States vessels, and some traffic of United States origin is carried in Canadian vessels. This great waterway is paralleled to the north and to the south throughout its whole course by many railway lines, which also carry an enormous traffic of mixed national origin and destination.

Among the materials necessary as a basis for a reasonable judgment on the economic feasibility of the canal in its relation to general traffic, there should be facts covering the following points:—

(1) The magnitude of the total traffic of both countries that now so moves and that may in the future so move as to fall within the sphere of influence of such a canal. Traffic of Canadian origin or destination, that is, traffic that enters into Canadian trade, should be differentiated from United States traffic in order that it may be considered separately, for the national advantage to Canada of benefits conferred on Canadian traffic would be much more direct and would be calculated on broader grounds than would the advantage to Canada that might be incidental to benefits conferred on United States traffic.

(2) The routes now followed by traffic and the causes of the present distribution. If necessary in order to discover these causes, the goods must be traced from their point of origin right through to their ultimate destination, even if this involves a study of transportation conditions on the ocean and of the methods and demands of foreign markets.

(3) The classes of goods now constituting the traffic, and the possibilities of increase in each of these classes and of the addition to the traffic of new classes of goods.

(4) The present nature and probable tendencies of railway competition against the water routes.

The traffic that would probably feel first and most directly the influence of a new canal is the traffic that now passes by water between the East and the West in North America. This report represents the results of an investigation of this waterborne traffic along the above general lines. No detailed study of the rail-borne traffic and of railway competition has yet been made.

In the summary statement no attempt is made at exhaustive treatment, but rather the facts of a single year or with respect to a single article are selected to illustrate general conditions found to exist, and diagrams are freely used. Indeed, much of the report is but an explanation of the diagrams. In the appendix are given tables of statistics, some compiled direct from original material and some taken from various authoritative publications, which will in most cases provide material for a much more extended study. The year 1913 has been chosen for special attention, first because the traffic movement was greater in that year than in any other, and second, because 1913 was the latest complete year before the disturbances created by the war, and witnessed the fullest manifestation of the tendencies of what may be called normal times. Normal conditions must be understood before the abnormal can be rightly judged.

There is included in the appendix also a precis index of Hansard Debates of the House of Commons and the Senate on the Georgian Bay Ship Canal, 1902-13.

As many other problems, beside that of the Georgian Bay canal, depend upon the same fundamental facts, it is possible that the material herein presented may prove of interest in more than the one practical direction.

In this report, the quantities, and not the values, of freight traffic are taken into consideration, whenever these can be obtained, and less attention is paid to freight rates than to the general conditions that underlie freight rates.

It is the weight, or the bulk, of freight traffic that chiefly creates a transportation problem, and not its value. Cargoes and carloads are measured by tons and not by dollars. To illustrate: In the fiscal year 1912-13, Canada imported unset diamonds to the value of $3,846,360.[1] If put into one package, these diamonds would probably weigh abou. 14 pounds, and the whole package could be thrown into the corner of the

[1] Report of the Department of Customs, Trade and Navigation, year ending March 31, 1913, p. 354.

small safe in one express car. In the same fiscal year, Canada imported large quantities of soft coal, aggregating over five times the value of the diamonds. Taking for comparison the quantity of soft coal which at the entered price would give a value equal to the diamonds, we have a freight tonnage of 1,923,175 tons. According to the report of the Department of Railways and Canals,[1] there were in that year on all the railways in Canada a total of 14,746 coal cars, with an average capacity of 38½ tons. If all these cars were assembled to carry the above amount of coal, each car would have a little over 3½ loads. Put in another way, if these cars were made up into trains of forty cars each, and twelve such trains were despatched per day, it would take 104 days to move the load. Here we have a big transportation problem, whereas the same value in diamonds offers no transportation problem at all, but only an insurance or police problem. It may be much more profitable for a country to produce or trade in goods that must be weighed by ounces or pounds, but it is only tons, no matter what their value, that can fill vessels or cars and that require new canals, deeper channels, more railway lines and heavier rails and bridges.

Freight rates do not always explain traffic movements, and are sometimes symptoms rather than causes. A relative cheapness of rates will not always divert traffic from other routes; for traffic often seems to move upstream against higher rates. There are many conditions which determine the routing of traffic, and it is impossible to reach sound practical conclusions by studying freight tariffs alone. What has been sought in the present investigation is the causes of traffic movements, whether these causes have manifested themselves in freight rates or not. There may be artificial interferences with the operation of these fundamental causes, such as may arise from the exercise of governmental regulation on the one side, or from conferences, affiliations, pools, or combinations on the other, but it has not been possible in the time to trace the influence on the courses of traffic that may have been exerted by these means.

[1] Railway Statistics, year ending June 20, 1913, p. 139.

FREIGHT TRAFFIC TO AND FROM LAKE SUPERIOR.[1]

The principal volume of waterborne traffic between the East and the West in North America passes back and forth through the Sault Ste. Marie canals, and it can there be conveniently measured and analysed owing to the admirable statistical reports[2] prepared under the direction of Lt.-Col. Mason M. Patrick, Corps of Engineers, U.S. Army, covering the traffic of both countries through all the canals, and of the Canadian Department of Railways and Canals[3] dealing specially with the traffic through the Canadian canal.

In diagram 1 is represented in graphic form the total freight traffic of Canada and of the United States combined, passing through the canals at Sault Ste. Marie, Ontario and Michigan, during the season of navigation of the year 1913.[4]

Fig. 1 shows the total freight traffic divided into eastbound and westbound traffic. Of a total freight traffic of 79,718,344 short tons, there passed eastbound 59,205,853 tons, and westbound 20,512,491 tons. Among the points to be noted are:—

(1) The magnitude of this traffic. In tons of cargo and in net registered tonnage of vessels, the traffic through the Sault Ste. Marie canals during somewhat less than eight months of open navigation greatly exceeded the twelve months' total of any other canal or of any single port in the world. Its figures, so far as narrow waterways are concerned, are apparently surpassed only by those of the Detroit river,[5] which, in addition to carrying over 87 per cent of the traffic which also passes through the Sault Ste. Marie canals, carries traffic to and from lake Michigan, lake Huron, and Georgian bay and local traffic for Detroit river ports. A direct comparison in freight tons with the traffic through the Suez canal is not practicable, but the net registered tonnage of vessels passing through the Suez canal in the year 1913 was 20,033,884 tons, while the net registered tonnage of vessels passing through the Sault Ste. Marie canals in the navigation season of the same year was 57,989,715 tons.

(2) The distribution of traffic as between eastbound and westbound, the ratio being 2.88 to 1.

(3) The growth of the traffic. In the appendix[6] are given detailed figures for 1911 to 1915. In 1890 the total freight traffic was 9,041,213 tons; in 1900, 25,643,073 tons, and in 1913, 79,718,344 tons.

Fig. 2 shows the origin of the traffic.[6] No matter what the original national source or the ownership of the goods may be, the traffic originating at Canadian ports is, in accordance with the commonly accepted definition, called Canadian traffic, and is represented in solid black; while the traffic originating at United States ports is called United States traffic, and is represented by the hatched portions of the figures.—Out of a total eastbound traffic of 59,205,853 short tons there originated at Canadian ports 6,103,847 tons, or 10.30 per cent. Out of a total westbound traffic of 20,512,491 tons there originated at Canadian ports 771,410 tons, or 3.27 per cent. Of the total eastbound and westbound traffic combined, 6,875,257 tons, or 8.62 per cent, was of Canadian origin.

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[1] Appendix Tables 1-17, pp. 87-103, Statistics, 1911-15.

[2] Annual Statistical Reports of Lake Commerce, passing through canals at Sault Ste. Marie, Ontario and Michigan, with a Supplementary Report of commerce passing through the Detroit River.

[3] Canal Statistics.

[4] Appendix, Table 1, p. 87, Statistics, 1911-15.

[5] Appendix, Table 2, p. 87, Statistics, 1911-15.

Fig. 3 shows the destination of the traffic,[1] that is the freight shipped to Canadian ports as compared with the freight shipped to United States ports. Of the total eastbound freight, 6.11 per cent, or 3,619,636 tons, was destined to Canadian ports in the east; while of the total westbound freight, no less than 29.02 per cent, or 5,954,388 tons, was destined to Canadian ports in the west.

It will be noted that there are marked differences in the relative proportions of traffic in figures 2 and 3. It is evident, for example, that a much smaller amount of freight arrived at Canadian ports in the east than was shipped from Canadian ports in the west, the difference being 2,484,211 tons. This means that a large amount of Canadian freight, eastbound, was shipped to United States ports, and that there was not a corresponding amount of United States freight shipped to Canadian ports. The heavy shipments of Canadian grain and flour to United States ports are not offset by any correspondingly large movement of United States traffic, at least from the Lake Superior district, to Canadian ports. On the other hand, nearly 7¾ times as much freight arrived at Canadian ports in the west as was shipped from Canadian ports in the east, the difference in this case being accounted for chiefly by the large shipments of United States coal to Canadian ports in the west.

Distribution of traffic by lake districts.—Leaving the St. Marys river the traffic eastbound divides, one portion diverging to ports on lake Michigan, one to ports on lake Huron and Georgian bay, a very large portion to lake Erie ports, while the balance goes to ports on lake Ontario and the St. Lawrence river. Westbound, streams of traffic converge from all these districts. It has not so far been found practicable to work out the traffic belonging to each individual port, but the material is available for estimating the traffic of ports grouped according to lake districts.

It is clearly important to understand how existing traffic by water is routed. Traffic between lake Michigan and lake Superior will probably, for example, prove to have little bearing on the problem of a Georgian Bay canal; and again, the traffic now received at and shipped from lake Erie ports must be examined with a view to determining to what extent this routing is due to the fact that the commodities constituting the westbound traffic originate in districts directly tributary to lake Erie, and to what extent the eastbound traffic now received at those ports is influenced by fundamental causes, such as consumption demand or the existence of through export facilities. With regard to the traffic with lake Huron and Georgian bay and with lake Ontario, it will be important also to inquire what proportion belongs to local districts that could not be served by an alternative route through a Georgian Bay canal. At this stage, however, only the general facts of distribution will be presented.

Total traffic by the lake districts.[2]—In diagram 2 is shown the total eastbound traffic through the Sault Ste. Marie canals during the season of navigation of 1913, divided according to the lake districts to which the freight was shipped, and the total westbound traffic divided according to the lake districts from which the freight was shipped. Comparing the quantity shipped to lake Erie in the eastbound figure with the quantity shipped from lake Erie in the westbound figure, the relation of outward to return cargoes with respect to that lake district is indicated; and so with each of the other lake districts. The preponderance of the traffic with lake Erie ports is strikingly apparent.

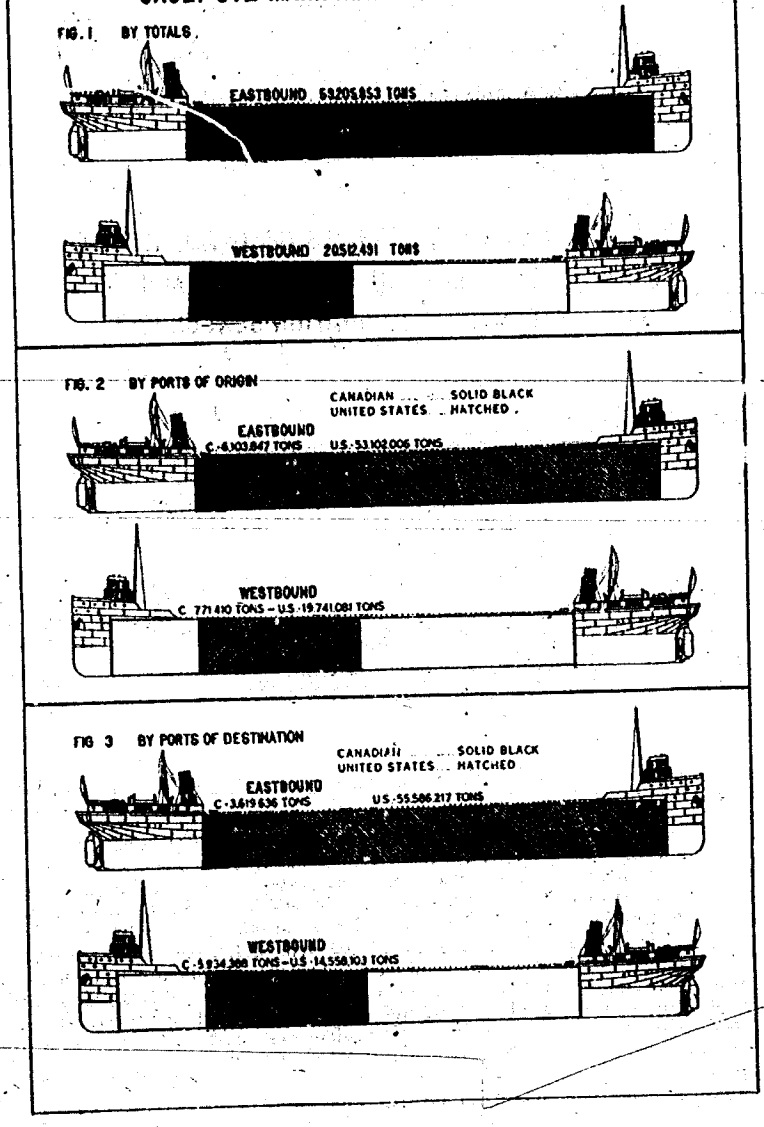
Of a total eastbound freight traffic of 59,205,853 tons, there was shipped to ports on lake Erie, 49,427,101 tons, or 83.48 per cent; while of a total westbound traffic of 20,512,491 tons, there was shipped from ports on lake Erie, 19,297,105 tons, or 94.07 per cent. Of the combined total of eastbound and westbound traffic of 79,718,344 tons, the traffic between lake Erie and lake Superior amounted to 68,724,206 tons, or 86.2 per cent.

Traffic with lake Michigan ports comes second in total amount, although it is only about one-twelfth as great as the traffic between lake Superior and lake Erie, the figures

[1] Appendix, Table 3, p. 88, Statistics, 1911-15.

[2] Appendix Table 4, pp. 88-90, Statistics, 1911-15.

EAST AND WESTBOUND DISTRIBUTION OF TOTAL TRAFFIC THROUGH CANADIAN AND AMERICAN CANALS AT SAULT STE MARIE. NAVIGATION SEASON 1913

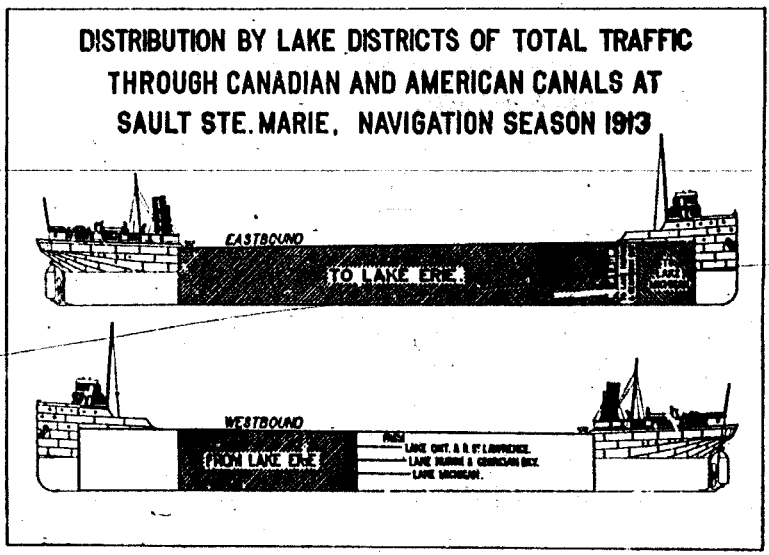


being 6,704,080 tons, or 8.40 per cent. Eastbound there was shipped to lake Michigan, 6,376,535 tons, or 10.77 per cent of the total, and from lake Michigan ports westbound there was shipped 327,545 tons, or 1.59 per cent of the total westbound freight.

Of the combined total eastbound and westbound, the traffic between lake Huron and Georgian bay and lake Superior amounted to 2,885,890 tons, or 3.62 per cent. To lake Huron and Georgian bay ports there was shipped eastbound, 2,445,945 tons, or 4.14 per cent; and westbound from lake Huron and Georgian bay ports, 439,945 tons, or 2.14 per cent.

Of the combined total eastbound and westbound, the traffic between lake Ontario and St. Lawrence river and lake Superior amounted to 1,404,168 tons, or 1.76 per cent. To lake Ontario and St. Lawrence river ports there was shipped 956,272 tons, or 1.61

DIAGRAM No. 2.



per cent, and from lake Ontario and St. Lawrence river ports there was shipped westbound 447,896 tons, or 2.18 per cent.

Canadian traffic by lake districts.[1]—Of a total traffic of Canadian origin amounting to 6,875,257 tons, 48·33 per cent, or 3,322,534 tons was traffic to and from lake Erie ports. Traffic with lake Huron and Georgian bay ports came second, with 2,361,375 tons, or 34.34 per cent. Traffic with lake Ontario and river St. Lawrence ports amounted to 1,107,317 tons, or 16.10 per cent. From Canadian ports on lake Superior to ports on lake Michigan there was shipped 84,031 tons or 1.22 per cent of the total.

In this traffic with lake Erie nearly all the freight was eastbound, very little freight westbound having originated at the Canadian ports on that lake. Lake Ontario and river St. Lawrence ports supplied a little over one-half of the westbound traffic, namely, 394,148 tons, or 51.09 per cent of the total Canadian westbound traffic. Lake Huron and Georgian bay ports supplied 353,395 tons, or 45.81 per cent.

[1] Appendix, Table 5, p. 91, Statistics, 1911-15.

The particulars are as follows:—

TOTAL Canadian traffic by lake districts—Navigation season, 1913.

Direction.	Lake Ontario and River St. Lawrence.		Lake Erie.		Lake Huron and Georgian Bay.		Lake Michigan.		Total Tons.
	Total Tons.	Per Cent.	Total Tons.	Per Cent.	Total Tons.	Per Cent.	Total Tons.	Per Cent.	
From lake Superior eastbound to.....	713,169	11·68	3,298,637	54·04	2,007,980	32·89	84,031	1·38	6,103,847
To lake Superior westbound from..	394,148	51·09	23,867	3·09	353,396	45·81	.....	....	771,410
Combined total.	1,107,317	16·10	3,322,504	48·33	2,361,376	34·34	84,031	1·22	6,875,257

Of the total traffic originating at Canadian ports which was shipped to Canadian ports[1], lake Huron and Georgian bay had 52·10 per cent, lake Ontario and the St. Lawrence river, 29·02 per cent, and lake Erie, 18·87 per cent. When the westbound shipments are examined separately, lake Ontario and the St. Lawrence river stand first with 52·93 per cent, and then follow lake Huron and Georgian bay with 44·08 per cent, and lake Erie with 2·97 per cent. The particulars are as follows:—

CANADIAN traffic to Canadian ports by lake districts—Navigation season 1913.

Direction.	Lake Ontario and River St. Lawrence.		Lake Erie.		Lake Huron and Georgian Bay.		Lake Michigan.		Total Tons.
	Total Tons.	Per Cent.	Total Tons.	Per Cent.	Total Tons.	Per Cent.	Total Tons.	Per Cent.	
From lake Superior eastbound to.....	713,169	23·29	694,592	22·68	1,654,098	54·02	....	.....	3,061,859
To lake Superior westbound from.....	388,666	52·93	21,867	2·97	323,700	44·08	.....	....	734,233
Combined total. . . .	1,101,835	29·02	716,459	18·87	1,977,798	52·10	.....	.....	3,796,092

Of the traffic originating at Canadian ports which was shipped to United States ports,[2] no less than 84·63 per cent was traffic with lake Erie, nearly all being eastbound grain shipments from Fort William and Port Arthur to United States ports on that lake. The eastbound shipments to United States ports on lake Huron are also chiefly grain to Port Huron.

[1] Appendix, Table 6, p. 92, Statistics, 1911-15.
[2] Appendix, Table 7, p. 93, Statistics, 1911-15.

The particulars are as follows:—

CANADIAN traffic to United States ports by lake districts—Navigation season 1913.

Direction.	Lake Ontario and River St. Lawrence.		Lake Erie.		Lake Huron and Georgian Bay.		Lake Michigan.		Total Tons.
	Total Tons.	Per Cent.	Total Tons.	Per Cent.	Total Tons.	Per Cent.	Total Tons.	Per Cent.	
From lake Superior east-bound to.....	.....	....	2,604,875	85·60	353,882	11·63	84,031	2·76	3,041,988
To lake Superior west-bound from.....	5,482	14·74	2,000	5·38	29,695	79·87	.....	....	37,177
Combined total.....	5,482	·17	2,606,875	84·63	383,577	12·46	84,031	2·73	3,079,165

United States Traffic by Lake Districts.[1]—Practically 90 per cent of all traffic originating at United States ports moves between lake Erie and lake Superior. Some large shipments of iron ore go to lake Michigan, and there are grain shipments to lake Michigan, to lake Huron and Georgian bay and to lake Ontario and the St. Lawrence river. Principally because of its coal shipments, lake Erie supplies 97·63 per cent of all United States traffic carried westward.

The particulars are as follows:—

TOTAL United States traffic by lake districts—Navigation season 1913.

Direction.	Lake Ontario and River St. Lawrence.		Lake Erie.		Lake Huron and Georgian Bay.		Lake Michigan.		Total Tons.
	Total Tons.	Per Cent.	Total Tons.	Per Cent.	Total Tons.	Per Cent.	Total Tons.	Per Cent.	
From lake Superior eastbound to.....	243,103	·46	46,128,431	86·86	437,965	·82	6,292,504	11·85	53,102,006
To lake Superior west-bound from.....	53,748	·27	19,273,238	97·63	86,550	·43	327,545	1·66	19,741,081
Combined total.....	296,851	·41	65,401,672	89·78	524,515	·72	6,620,049	9·08	72,843,087

The chief features of United States traffic shipped to Canadian ports[2] are the large shipments from lake Erie, principally coal, the shipments of grain to lake Huron and Georgian bay and to lake Ontario and the St. Lawrence river. Part of this grain is Canadian grain shipped via Duluth and Superior, but as the shipment is from a port in the United States it is from the transportation standpoint United States traffic.

[1] Appendix, Table 8, p. 94, Statistics, 1911-15.
[2] Appendix, Table 9, p. 95, Statistics, 1911-15.

The particulars are as follows:—

UNITED STATES traffic to Canadian ports by lake districts—Navigation season 1913.

Direction.	Lake Ontario and River St. Lawrence.		Lake Erie.		Lake Huron and Georgian Bay.		Lake Michigan.		Total Tons.
	Total Tons.	Per Cent.	Total Tons.	Per Cent.	Total Tons.	Per Cent.	Total Tons.	Per Cent.	
From lake Superior eastbound to.....	196,495	35·23	95,548	17·18	265,734	47·64	.....	...	557,777
To lake Superior westbound from.....	43,374	·83	5,097,086	97·61	3,691	·07	76,001	1·46	5,220,155
Combined total.....	239,869	4·15	5,192,634	89·87	269,428	4·66	76,001	1·31	5,777,932

United States traffic shipped to United States ports[1] may be examined in the following table:—

UNITED STATES traffic to United States ports by lake districts—Navigation season 1913.

Direction.	Lake Ontario and River St. Lawrence.		Lake Erie.		Lake Huron and Georgian Bay.		Lake Michigan.		Total Tons.
	Total Tons.	Per Cent.	Total Tons.	Per Cent.	Total Tons	Per Cent.	Total Tons.	Per Cent.	
From Lake Superior eastbound to.....	46,608	·08	46,032,386	87·61	172,231	·33	6,292,504	11·97	52,544,229
To lake Superior westbound from.....	10,374	·07	14,176,152	97·62	82,856	·57	251,544	1·73	14,520,926
Combined total. ...	56,982	·08	60,209,038	89·78	255,087	·38	6,544,048	9·75	67,065,155

[1] Appendix, Table 10, p. 96, Statistics, 1911-15.

NUMBER, CAPACITY AND NATIONALITY OF VESSELS.

How many vessels were engaged in 1913 in the carrying of the enormous freight tonnage which passed through the Sault Ste. Marie canals? Of what types and sizes were these vessels, and how does the classification of 1913 compare with the classifications of earlier years? How many were Canadian vessels and how many United States vessels, and how did they compare as to capacity and what proportions of the traffic were carried by each? These and many other points must prove of practical interest and perhaps of great importance.

The development in type of vessels employed in the lake Superior trade will indicate the results of experience in economy and efficiency of transportation. The division of the total traffic, or of the traffic on certain routes, between Canadian and United States vessels will throw light on the nature and limits of national competition in the carrying trade under the present coasting laws and the existing conditions of trade. What is the present "load factor" of vessels in this trade, that is, how well filled are they on the average, how does the load in one direction compare with the load in the other, and on one route with another, and how is the load distributed in each direction throughout the season? How does the "load factor" of Canadian vessels compare with that of United States vessels? Such matters must be understood before the relative development possible to the Canadian carrying trade can be estimated and before the probable advantages or limitations of a new water route can be judged.

Development of Canadian carriers.—While by comparison with that of the United States the Canadian mercantile fleet on the inland waters is small, it is yet of considerable size and its capacity has been steadily growing.[1] In diagram 3 (fig. 1) is presented the comparative increase in gross tonnage of vessels of Canadian and British register engaged in the carriage of passengers and freight on the Great Lakes and connecting waters, the river St. Lawrence between Kingston and Montreal, the Rideau canal, and the Ottawa river between Ottawa and Montreal; that is, on the inland waters west of Montreal to the head of lake Superior.

In actual number of vessels there has been no great change in recent years, but the type and size have improved. In the fiscal year 1899-1900 there were 242 vessels so engaged; in 1905-06 the number was 270; and in 1913-14 the number was 265.

The size of the vessels thus registered for service on the above inland waters, as measured by the aggregate gross tonnage, was, in 1899-1900, 90,924 gross tons; in 1905-6, 157,625 gross tons; and in 1913-14, 310,176 gross tons. In 1913-14 there were five fewer vessels engaged than in 1905-6, but the aggregate size of the vessels had practically doubled. Larger vessels had been substituted for smaller vessels. The changes that have occurred in the aggregate size of vessels in the different classes, according to gross tonnage, are set forth in fig. 2 of diagram 3.

The great increase in capacity has been in the class of vessels of over 2,000 tons gross register (say, over 1,250 tons net register) and since 1908-9 the capacity of this class of vessels has been greater than that of any other class. A marked increase has also taken place in the aggregate capacity of vessels between 1,000 and 2,000 tons gross register. There has been an actual falling-off in the class of vessels between 500 and 1,000 tons gross register, while the capacity of vessels under 500 tons gross register has remained fairly constant, but in this smallest class the number of vessels has greatly decreased, showing that many of the very smallest vessels have been discarded and somewhat larger vessels substituted.

[1] Appendix, Table 18, p. 103, Statistics, 1899-1914.

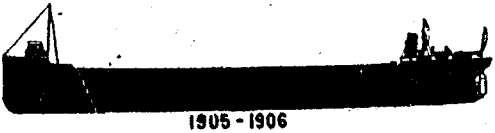
DEVELOPMENT OF CANADIAN VESSELS ON INLAND WATERS.

GROSS TONNAGE OF VESSELS REGISTERED IN CANADA & GREAT BRITAIN ENGAGED ON THE GREAT LAKES AND CONNECTING WATERS. WEST OF MONTREAL.

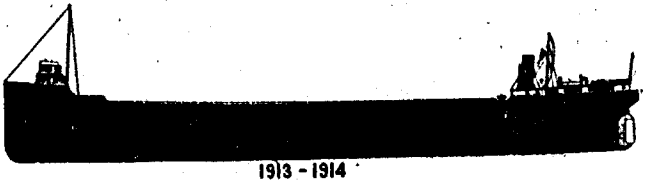
1899 - 1900

FIG. 1. COMPARISONS OF AGGREGATE TONNAGE.

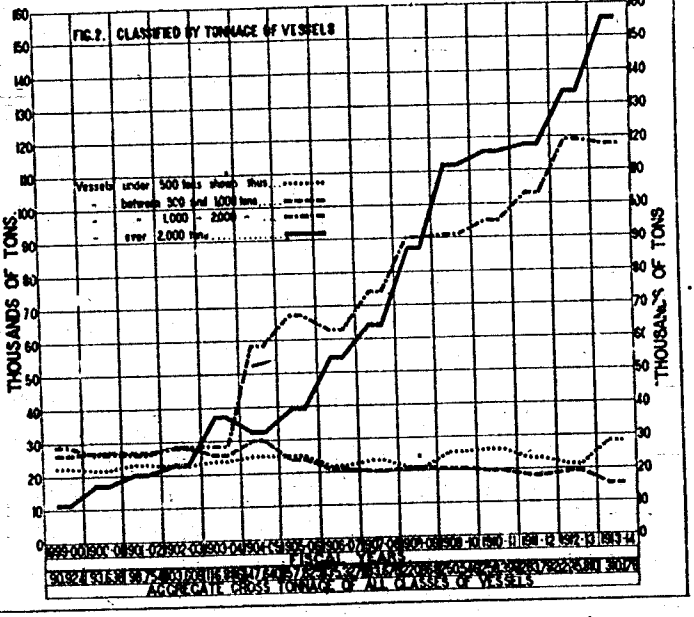
FISCAL YEAR	NO. OF VESSELS	GROSS TONNAGE
1899-1900	242	93.924
1905-1906	270	157.625
1913-1914	255	310.176



1905 - 1906



1913 - 1914



Of the above Canadian mercantile fleet, consisting in 1913-14 of 265 vessels of 310,176 tons gross register, or 214,550 tons net register, there passed through the Sault Ste. Marie canals in the navigation season of 1913,[1] 144 vessels of 170,558 tons net register; that is, 54·34 per cent of the number and 79·48 per cent of the capacity, showing that the larger vessels in the Canadian fleet were engaged in the Lake Superior trade to a greater extent than in the shorter trades.

In 1913,[1] 708 vessels of United States register, having a capacity of 1,807,412 net registered tons, passed through the Sault Ste. Marie canals. Compared with the Canadian, they were 4·91 times as numerous; their value was 8·31 times as great; and they had 10·59 times the capacity. On the average the United States vessels were thus very much larger than the Canadian, and had a relatively greater carrying capacity in proportion to capital invested. The United States vessels carried 15·17 times as much freight as Canadian vessels, and were thus more heavily loaded or made a greater number of trips. It should be noted, however, that Canadian vessels carried 47,825 passengers, while the United States vessels carried only 29,369 passengers. Relatively there were more passenger boats in the Canadian fleet. The particulars are as follows:—

CANADIAN VESSELS.

Class.	No.	Valuation.	Tonnage.		Passengers.
			Registered.	Freight Short Tons.	
Steamers	141	$15,155,700	167,381	4,816,355	47,825
Sailing	3	140,000	3,177	4,013	.....
Unregistered	....	.....	.....	109,231	.....
Totals	144	$15,295,700	170,558	4,929,599	47,825

UNITED STATES VESSELS.

Steamers	594	$122,418,600	1,644,081	70,357,467	29,369
Sailing	114	4,707,000	163,328	4,256,809	.....
Unregistered	.....	.....	.....	174,469	.....
Totals	708	$127,125,600	1,807,412	74,788,745	29,369
Grand Totals	852	$142,421,200	1,977,970	79,718,344	77,194

Total Traffic by Nationality of Vessels.[2]—Of the total eastbound freight traffic through the Sault Ste. Marie canals in 1913, 3,389,860 tons, or 5·72 per cent, was carried in Canadian vessels, and 55,815,993 tons, or 94·28 per cent, was carried in United States vessels; while of the total westbound freight traffic, 1,539,739 tons, or 7·50 per cent, was carried in Canadian vessels, and 18,972,752 tons, or 92·50 per cent, was carried in United States vessels. Of the combined eastbound and westbound total, 6·18 per cent was carried by Canadian vessels and 93·82 per cent by United States vessels.

Of the traffic originating at Canadian ports and amounting to 6,103,847 tons eastbound and 771,410 tons westbound, Canadian vessels carried of the former 3,165,610 tons, or 51·86 per cent, and of the latter, 761,535 tons, or 98·71 per cent; or of the

[1] Appendix, Table 11, pp. 97-98, Statistics, 1911-1915.

[2] Appendix, Table 4, pp. 88-90, Statistics, 1911-1915.

total eastbound and westbound combined, amounting to 6,875,257 tons, Canadian vessels carried 3,027,145 tons, or 57·11 per cent.

With regard to traffic destined to Canadian ports, of the total of 3,619,636 tons eastbound, Canadian vessels carried 3,256,109 tons, or 90·71 per cent; while of the total westbound, amounting to 5,954,388 tons, Canadian vessels carried 1,515,437 tons, or 25·40 per cent. Out of the total eastbound and westbound combined, Canadian vessels carried 4,708,546 tons, or 50·12 per cent.

Because of the coasting laws, Canadian vessels of course carried all the Canadian traffic destined to Canadian ports, but of the eastbound traffic originating at Canadian ports which was shipped to United States ports, amounting to 3,041,988 tons, Canadian vessels carried only 103,751 tons, or 3·41 per cent. Of the westbound traffic of Canadian origin destined to United States ports, amounting to 37,177 tons, Canadian vessels carried 27,802 tons, or 73·43 per cent.

Of the traffic originating at United States ports and shipped eastbound to Canadian ports, amounting to 557,177 tons, Canadian vessels carried 224,250 tons, or 40·2 per cent. Of the large westbound traffic of United States origin destined to Canadian ports, amounting to 5,220,155 tons, Canadian vessels carried 778,204 tons, or 14·90 per cent.

Distribution by Nationality of Vessels According to Lake Districts.[1]—Traffic between Lake Superior and Lake Ontario and River St. Lawrence ports is largely controlled by Canadian carriers. Out of a total eastbound of 956,272 tons, Canadian vessels carried 749,364 tons, or 78·36 per cent; and out of a westbound total of 447,896 tons, Canadian vessels carried 424,705 tons, or 94·08 per cent; or out of a combined total of 1,404,168 tons, Canadian vessels carried 1,174,069 tons, or 83·61 per cent.

The traffic with Lake Huron and Georgian Bay ports is also largely controlled by Canadian vessels. Of the eastbound total of 2,445,945 tons, Canadian vessels carried 1,820,349 tons, or 74·42 per cent; of the westbound total of 439,945 tons, Canadian vessels carried 345,854 tons, or 78·61 per cent; or of a combined total of 2,885,890 tons, Canadian vessels carried 2,166,203 tons, or 75·07 per cent.

Of the enormous traffic with lake Erie ports, Canadian vessels carried a very small portion; of the total eastbound business, 1·62 per cent, and of the total westbound business, 3·81 per cent, and of the combined total only 2·24 per cent. Nevertheless, Canadian vessels carried more tons of freight to and from lake Erie ports than to and from ports on lake Ontario and the St. Lawrence river.

With lake Michigan ports the traffic of Canadian vessels was relatively insignificant.

[1] Appendix, Table 4, pp. 88-90, Statistics, 1911-1915.

The particulars of distribution by nationality of vessels by lake districts are as follows:—[1]

TOTAL traffic and percentages carried by Canadian and United States vessels according to lake districts—Navigation season 1913.

Direction.	Nationality of Vessels.	Lake Ontario and River St. Lawrence.		Lake Erie.		Lake Huron and Georgian Bay.		Lake Michigan.	
		Total Tons.	Per Cent.	Total Tons.	Per Cent.	Total Tons.	Per Cent.	Total Tons.	Per Cent.
From lake Superior eastbound to.....	Canadian.	749,364	78·36	804,353	1·62	1,620,349	74·42	15,794	·24
	U. S. ...	206,908	21·64	48,622,748	98·38	628,596	25·58	6,360,741	99·76
Total eastbound....	.....	956,272	.....	49,427,101	...	2,445,945	.....	6,376,535	
To lake Superior westbound from...	Canadian.	424,705	91·08	735,200	3·81	345,654	78·61	33,980	10·37
	U. S.....	23,191	5·92	18,561,905	96·19	94,091	21·39	293,563	89·63
Total westbound.....	.....	447,896	.....	19,297,105	.	439,945	.....	327,545	
Combined east and westbound totals..	Canadian.	1,174,069	83·61	1,539,553	2·24	2,166,203	75·07	49,774	·75
	U. S.....	230,099	16·39	67,184,653	97·76	719,687	24·93	6,654,306	99·25
Grand total.....	.....	1,404,168	.....	68,724,206	.....	2,885,890	.....	6,704,080	

[1] Appendix, Table 4, pp. 88-90, Statistics, 1911-1915.

LOAD FACTOR.

Cost of transportation per unit of cargo, and therefore the economic basis of freight rates, must depend largely on the load factor obtaining for the carriers. If a vessel has a full load each way on every trip it will operate at the maximum of efficiency and at the lowest cost per unit of cargo. The load factor may fall short of this ideal in two general ways; there may be enough freight in one direction to furnish full loads, but not enough in the opposite direction to furnish more than partial loads, or the freight may be offered so irregularly in either direction or in both directions that the loads vary throughout the season. To meet the requirements of any particular "trade" there must be vessels enough to carry the maximum amount of freight offering for shipment at any particular time. If, then, the freight does not continue to be regularly offered throughout the season, but if, for example, the amount in one period of the year is very much less than the amount in some other period, then the shipping either will be uneconomically employed in the slack months, or vessels must be diverted to other trades; and in either case average costs per unit of cargo will tend to be increased. In the same way, if outward and return freights are unequal, the number of vessels must be proportionate to the greater of these quantities, and the voyage in the opposite direction will not be fully efficient, which likewise will increase average costs per unit of cargo. Transportation costs per unit of cargo are therefore, other things being equal, lowest in that trade offering the most favourable load factor. Among the other general conditions determining costs are distance, or the comparative length of the voyage, and time, which is not necessarily in exact proportion to the number of miles to be travelled. We have thus three general factors affecting the economic basis of freight rates and therefore the relative advantages of competitive routes:—

(1) Distance, or the length of one route as compared with another. Certain costs are almost directly proportionate to distance travelled. In long-voyage trades the vessel can make fewer round trips in a season than in short-voyage trades, and must distribute its season's costs over a smaller number of cargoes. Put in another way, it takes a larger number of vessels to move the same amount of freight in a season over long routes than over short routes, and therefore the freight on the long route must meet the costs of the larger number of vessels.

(2) Time, or the period necessary for a round trip. If navigation on one route is rendered slower than on another because of obstructions, such as canals, or narrow or shallow waterways, requiring slower speeds, the costs on that route as compared with the more open route will be relatively higher. On the other hand, the length of time a vessel must spend in port in a season in loading and unloading must be taken into account. In short-voyage trades a vessel is in port more frequently than in long-voyage trades, and a greater proportion of its time is spent in loading and unloading. This will tend to modify the factor of distance in favour of the long-voyage trade. On one route half as long as another route a vessel will not be able to make quite twice as many voyages in a season because it will have to spend almost twice as much time in loading and unloading.

(3) Load factor, as discussed above.

General load factor in the Lake Superior Trade.[1]—Eastbound, in 1913, there passed through the Sault Ste. Marie canals, 29,067,251 net registered tons of shipping, carrying 59,205,853 short tons of freight. There were thus 2·03 short tons of cargo for every net registered ton of vessel capacity. A net registered ton equals 100 cubic feet of space, and the average long ton of freight is assumed to occupy 40 cubic feet. According to these accepted standards of measurement it may be assumed that a vessel can carry approximately 2½ long tons of average freight per registered ton.[2] There are many passenger and package freight vessels in the Lake Superior trade in which the freight capacity would fall much below the theoretical standard, and on many occasions vessels of all classes must have sailed with comparatively light loads. In view of these conditions, and even allowing for the difference between the short ton and the long ton, an average record for a total season of 2·03 short tons of cargo for every net registered ton that passed through the canals is remarkable. Such results could occur probably only in a trade in which a large proportion of the freight consisted of heavy bulk commodities such as iron ore, of which, upon occasion, more than 2½ long tons could be loaded into each registered ton of space. In view of the above figures it may fairly be said, therefore, that the freight boats in the Lake Superior trade went east with full loads, and to this extent approached the ideal of economic loading in that direction.

On the return trips westbound, however, only 20,512,491 short tons of freight were carried, or only a little over one-third of the freight carried on eastbound trips. The exact ratio was 2·88 eastbound to 1 westbound. In 1912 the ratio was 3·23 to 1, and in 1911, 2·13 to 1. This disparity between eastbound and westbound traffic is a departure from ideal conditions; but there are few trades in the world in which freight is even approximately equal in both directions, and a ratio of 2 or 3 to 1 cannot be regarded as exceptionally unfavourable.

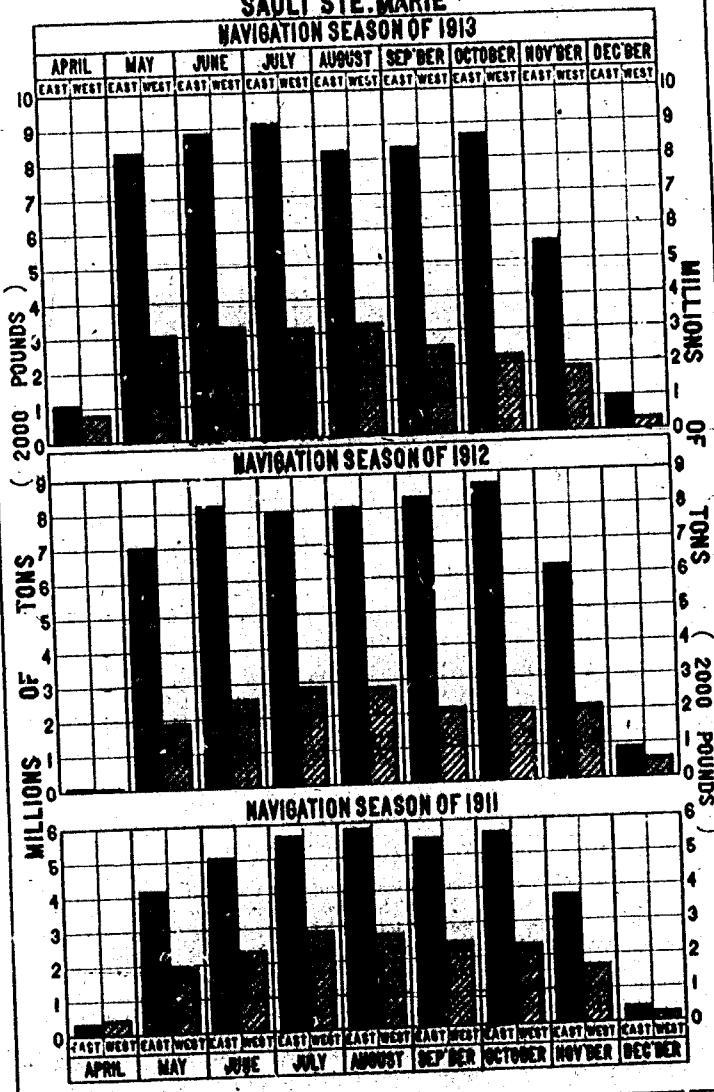
The second important condition of satisfactory traffic is the regularity with which freight is offered throughout the season. A vessel might sail full on every trip it made, but might not be able to make regular trips because freight was not available at all times; or a greater quantity of freight might be offered in one month, necessitating the employment of a large number of vessels, while in some other month, or months, comparatively little freight might be offered, causing the laying-up of certain vessels or their diversion to other trades. The vessels remaining in the trade might continue to carry good loads, but the general load factor of that trade would become unfavourable.

Monthly Distribution of Eastbound and Westbound Traffic.[1]—In diagram 4 the quantities of freight carried in each month of the navigation season are shown for the years 1913, 1912, and 1911. The solid black columns represent the quantities of eastbound freight, and the hatched columns the quantities of westbound freight. The full months of open navigation on the Great Lakes are May to November, inclusive. Ordinarily navigation is open for a week or two at the end of April, and, at increased insurance, the season is extended at least until the 10th of December. April and December are thus short months. Comparing the heights of the solid black columns it is seen that the eastbound freight is offered with great regularity, November showing the smallest quantity, due to the falling-off in iron ore shipments after the first heavy frosts. Still more remarkable under the conditions, however, is the evenness of the westbound shipments. With only about one-third of a load for the mercantile fleet in that direction, the westbound freight is distributed throughout every month of the navigation season. The fleet could carry all the westbound freight in less than three

[1] Appendix, Table 16, p. 101, Statistics, 1911-1915.

[2] Buoyancy differs with types of construction and this theoretical standard could not often be reached under actual loading conditions.

MONTHLY DISTRIBUTION OF TOTAL EAST AND WEST BOUND TRAFFIC THROUGH CANADIAN AND AMERICAN CANALS AT SAULT STE. MARIE



months, but, instead, it receives about one-third of a load for each trip. The monthly distribution of traffic in this trade therefore approximates the ideal, assuming that the ratio of eastbound to westbound must be 2 or 3 to 1.

The detailed figures showing the tons of freight carried each month in relation to the total net registered tonnage passing through the canals are as follows:—

FREIGHT tons per registered ton by months—season of 1913.

EASTBOUND.

Month.	Net Registered Tonnage.	Freight Carried.	Freight Tons per Ton Registered.
April	568,691	1,098,123	1·93
May	4,116,487	8,332,178	2·02
June	4,301,178	8,855,821	2·05
July	4,379,149	9,107,569	2·07
August	4,036,966	8,263,273	2·04
September	4,073,226	8,348,801	2·04
October	4,233,721	8,675,690	2·04
November	2,868,919	5,574,135	1·94
December	489,014	950,363	1·94

WESTBOUND.

April	948,742	807,432	·85
May	4,069,577	3,041,017	·74
June	4,339,264	3,257,792	·75
July	4,317,883	3,170,055	·73
August	3,996,387	3,226,169	·80
September	4,051,030	2,561,564	·63
October	4,300,612	2,243,684	·52
November	2,641,354	1,871,042	·70
December	257,645	330,236	1·28

The highly favourable general load factor in the lake Superior trade, due to the satisfactory loading and to evenness of distribution throughout the season, must determine the economic basis of freight rates in this trade, and must to a large extent dominate the whole problem of transportation on the Upper Lakes. If the routing of any large proportion of the traffic in either direction were changed in such a way as to alter the average load factor, then the economic basis of freight rates could not remain what it was in 1913. The route with the more favourable load factor could at a certain point successfully compete against the route with the less favourable load factor, even against some decreased cost of navigation on the latter route. Again, if the load factor presented by traffic of Canadian origin happened to be less favourable than the load factor presented by traffic of United States origin, then Canadian traffic would tend to be subject to somewhat higher costs if handled exclusively by itself. If Canadian vessels attempt to operate on a less favourable load factor than United States vessels then they must be content to earn less profits, or at times perhaps even no profits at all.

Load Factor of Canadian Traffic.—Taking by itself the traffic originating at Canadian ports in 1913, we have 6,103,847 tons eastbound and 771,410 tons westbound, or a ratio of 7·91 to 1. This may be compared with the general ratio for all traffic of both Canadian and United States origin combined of 2·88 to 1. If the Canadian traffic had been handled separately, the vessels which carried the eastbound load would on the return trips have had only 12·64 per cent of their cargo space filled, instead of the

actual 34·75 per cent which, on the average, fell to all vessels engaged in the combined lake Superior trade that season.

With traffic of United States origin, the ratio of eastbound to westbound in 1913 was 2·69 to 1. If this traffic had been handled entirely by itself, the vessels which carried the eastbound loads would on the return trip have had 37·17 per cent of their space filled. Traffic of United States origin therefore presented from the transportation standpoint a much more favourable ratio than traffic of Canadian origin.

In 1911 the ratio with respect to traffic of Canadian origin was 4·09 eastbound to 1 westbound; in 1912, 4·70 to 1; and in 1913, as we have seen, 7·91 to 1. During these three years the ratio grew less favourable, due to the fact that the eastbound shipments of Canadian grain increased to a much greater extent than the westbound shipments of Canadian goods. With respect to United States traffic, the ratio in 1911 was 2·05 to 1; in 1912, 3·15 to 1; and in 1913, 2·69 to 1. In each of these years, therefore, the ratio for United States traffic was more favourable than that for Canadian traffic.

The second condition for a satisfactory load factor is evenness of distribution throughout the season. It is not practicable with the material now available to present separate diagrams of the monthly distribution of Canadian traffic and of United States traffic along the same lines as diagram 4, which represents the monthly distribution of the total combined traffic, but it is possible to give in tons the monthly shipments of grain from Fort William and Port Arthur, which in 1913 were as follows:—

	Tons.
April	305,260
May	703,704
June	316,718
July	415,110
August	191,160
September	269,937
October	1,353,071
November	1,172,559
December	845,942
Total	6,513,451

As grain forms the greatest part of the Canadian eastbound traffic, the above distribution may be accepted as approximately representing the distribution of eastbound Canadian traffic as a whole. Diagram 5 presents, in the solid black line, this monthly distribution worked out according to percentages, that is, the quantity shipped in each month is reduced to a percentage of the total amount of Canadian grain shipped in a season; and comparison is made with the distribution in percentages, similarly worked out, of the total combined eastbound traffic, as shown in the dotted line. Taking the months of May to October, for example, it will be seen that only about 3·47 per cent of the total season's Canadian grain load was carried in August, while 24·54 per cent was carried in October, and that wide variations existed also in the other months. But with the total combined traffic the monthly percentages remained within remarkably narrow limits, varying only between 13·96 per cent and 15·38 per cent. If we deduct Canadian grain from the total eastbound traffic the range of the balance would be only between 13·64 per cent and 16·19 per cent in the same months.

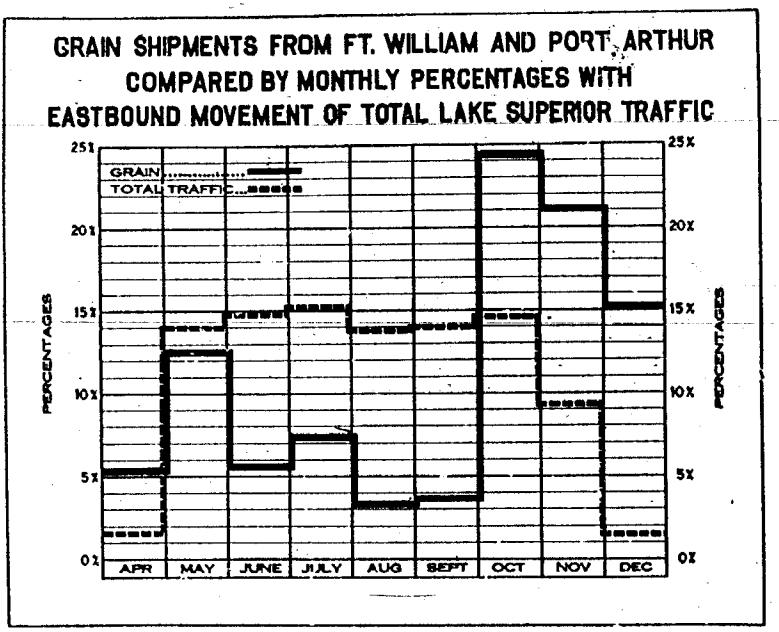
It is evident, therefore, that the load factor presented by Canadian traffic is much less favourable than that presented by United States traffic.

In this examination of traffic movement in the lake Superior trade, only general totals are taken into consideration. Any general conclusions indicated by the statistics here presented must be re-examined in the light of further analysis of details. In the matter of load factor, for example, the nature of the freight shipped must be taken into account. Bulk commodities and package freight present somewhat different

problems. United States traffic offers large quantities of bulk freight in both directions, while the bulk freight of Canadian origin is practically all in one direction, and consists of eastbound grain. This fact probably increases the unfavourable position of the load factor in Canadian traffic.

Load Factor of Canadian Vessels.[1]—Under the conditions prevailing in the lake Superior trade, actual and potential competition must exist between the mercantile fleets of Canada and the United States. Operating side by side in the same waters, there would be a tendency towards the same standards of service and of profits even if, by legislation, the spheres in which the respective fleets could operate were kept entirely separate. As it is, however, the coasting laws of the two countries leave

DIAGRAM No. 5.



open to competition all that portion of the traffic of the two countries which passes, or can be made to pass, from a port in *one* country directly to a port in the other country, either because the goods so shipped are destined to the latter country for consumption or can pass in transit through that country on favourable terms. There was thus open to competition in 1913, theoretically at least, all the traffic that was not carried directly from one Canadian port to another Canadian port and from one United States port to another United States port. Subtracting this coasting traffic from the totals, there remained 3,599,765 tons eastbound and 5,257,332 tons westbound open to competition. Canadian vessels were free, so far as legislative restrictions are concerned, to carry all of this traffic, and so were United States vessels. As a matter of fact this traffic was divided, the Canadian fleet securing 328,001 tons,

[1] Appendix, Table 4-12 to 15, pp. 88-98 to 100, Statistics. 1911-15.

or 9·11 per cent of the eastbound, and 805,506 tons, or 15·82 per cent of the westbound, or 12·79 per cent of the combined total. In proportion to the relative carrying capacities of the two fleets, the Canadian fleet secured somewhat the larger share. By adding competitive traffic in the above amounts to the traffic that exclusively belonged to it as being billed from one Canadian port to another Canadian port, the Canadian fleet changed an unfavourable load factor into one that was much more favourable.

More important, perhaps, than the mere statistical examination of the facts of the competitive division of traffic in the Great Lakes is the question of the extent to which competition does or may determine the diversion of traffic. Canadian grain from Fort William and Port Arthur for Europe can, for example, follow Canadian routes to a Canadian ocean port, it can go to certain United States lake ports and pass back from them to Canadian routes and ocean ports, or it can move through Canadian lake ports to United States ocean ports, or can directly take United States routes to United States ocean ports. The same is true of United States export grain from Duluth and Superior. Goods destined for lake Superior from the Eastern States have under certain conditions the choice between a Canadian lake port and a United States lake port. These are but examples of the alternatives that enlarge the possibilities of competition. How far do competitive conditions in lake shipping determine the routing of such traffic?

Goods are routed by the shipper, and either at his own discretion or on instructions of the consignee. In the routing, for example, of so much Canadian export grain to United States lake and ocean ports, is the decision of the shipper determined by such conditions as lower freight rates by United States vessels or to United States lake ports, or by a shortage of suitable Canadian vessels, necessitating the engaging of United States vessels which must sail to a United States lake port; or are the causes found, not in the lake shipping conditions at all, but in facilities beyond the lakes, such as the supply of ocean tonnage at the different ports of export?

In the general facts now under consideration, certain points may be noted having a bearing on these questions. The Canadian fleet, as it existed in 1913, carried all the Canadian grain and other goods actually routed from one Canadian port to another Canadian port, and in addition was able to carry eastbound 103,751 tons from Canadian to United States ports and 224,250 tons from United States ports to Canadian ports, and westbound picked up more than half its total load at United States ports. Again, the Canadian fleet eastbound carried on the average only 19·87 freight tons per registered ton of capacity, while the United States fleet carried 30·88 freight tons per registered ton. Even making allowance for the proportion of passenger and package freight boats, it would appear that the Canadian fleet could have carried a larger amount of freight than it did carry, at least if the freight had been regularly offered. That on the average for the season the Canadian fleet could have carried more Canadian traffic to Canadian ports, if it had been so billed, does not, of course, mean that at times of exceptionally heavy offerings of freight the Canadian fleet may not have been found inadequate.

That the Canadian fleet shares in the competitive traffic shows that it is able to meet competitive freight rates, and indeed it is obvious from all the facts that freight rates in the lake Superior trade must tend to be the same for like services with all vessels. If Canadian vessels could not, on the whole, give as favourable rates as United States vessels, they could not, with the various alternative routings possible, hold even the proportion of the traffic they carried in 1913. Two questions arise here: How are Canadian vessels able to meet the rates of United States vessels, and why is the Canadian fleet the size it is, that is, why is it not bigger or smaller? The load factor the Canadian fleet can establish must largely determine these matters.

If the Canadian fleet had carried all the traffic originating at Canadian ports, the ratio of its eastbound to its westbound load would have been 7·91 to 1. If it had been

confined to the Canadian traffic routed to Canadian ports, the ratio would have been 4·17 to 1. Both these ratios would have been unfavourable as compared with the general ratio in the lake Superior trade of 2·88 to 1. The Canadian fleet actually secured a ratio of 2·20 to 1. This result was due to its carrying eastbound only 3,165,610 tons, or 51·86 per cent, of the traffic originating at Canadian ports, and in addition, 234,250 tons originating at United States ports, and carrying westbound practically all the traffic originating at Canadian ports in the east, or 761,555 tons, which was 98·71 per cent of the total westbound Canadian traffic, and then adding 778,204 tons loaded at United States ports. The Canadian fleet carried eastbound a little more than one-half, the Canadian eastbound traffic, and carried westbound a little more than double the amount of the Canadian westbound traffic.

The amount of Canadian traffic carried by United States vessels, although a large percentage of all Canadian traffic, was relatively less important to the United States fleet than was the United States traffic to the Canadian fleet. Eastbound the United States fleet carried 2,938,237 tons, or 48·14 per cent of all the traffic originating at Canadian ports, but this amounted to only 5·26 per cent of the total eastbound load of the United States fleet. Westbound the United States fleet carried only 9,875 tons of Canadian traffic, or 0·05 per cent of its total westbound load. Its participation in Canadian traffic did not improve the general load factor of the United States fleet, for the ratio between the eastbound and westbound Canadian traffic carried by it was 297·54 to 1, but the Canadian traffic was relatively so small that it could be carried on occasional trips when other equally satisfactory cargoes did not happen to be offering.

In comparing the ratio for the Canadian fleet of 2·20 to 1 with the ratio of the United States fleet of 2·94 to 1, loading must be taken into account. Eastbound, as we have seen, the Canadian fleet carried relatively lighter loads, and even westbound it carried 9·03 freight tons per registered ton to 10·49 freight tons carried by the United States fleet. On the other hand, it carried a bigger proportion than the United States fleet of package freight, which is perhaps more profitable, and more passengers. If the Canadian fleet had on the average a longer route than the United States fleet, because more of its vessels made the long water trip to Montreal, this would modify the appearance of the figures of loading, since the vessels on longer routes cannot make so many trips in the season, and therefore cannot carry so many tons of freight. But it is doubtful if the route of the Canadian fleet is quite as long as that of the United States fleet, for the Canadian fleet carried 53·69 per cent of its load on the short route to lake Huron and Georgian bay, and only 22·10 per cent to lake Ontario and the St. Lawrence River ports, while the United States fleet carried 87·11 per cent of its load to lake Erie.

In their trade with lake Huron and Georgian bay ports, the Canadian vessels carried 1,820,349 tons eastbound and 345,854 tons westbound, an unfavourable ratio of 5·26 to 1. In their trade with lake Erie ports, however, the Canadian vessels carried 804,353 tons eastbound and 736,200 tons westbound, which gives the remarkably favourable ratio 1·09 to 1. In the trade with lake Ontario and River St. Lawrence ports, Canadian vessels carried 749,364 tons eastbound and 424,705 tons westbound, a ratio of 1·76 to 1. In the small trade with lake Michigan the Canadian vessels carried eastbound 15,794 tons, and westbound 93,980 tons, or a reversed ratio of 1 to 2·15. Lake Erie therefore offered the best load factor for Canadian vessels, at least for the bulk freighters. The second best load factor was found in the trade with lake Ontario and St. Lawrence ports, the westbound freight including 36,195 tons picked up at United States ports, and probably chiefly hard coal. The lake Ontario boats westbound could, of course, pick up soft coal at United States ports on lake Erie, but the carriage of soft coal is largely left to the bulk freighters, which cannot at present engage in the lake Ontario and St. Lawrence river trade. Grain freight rates on the shorter Georgian bay route are generally the same as to lake Erie ports, but the longer route presents a more favourable load factor.

On account of its containing a larger proportion of small and medium-sized vessels the Canadian fleet might appear to be at a competitive disadvantage so far as economy of handling is concerned. Vessels up to about 2,000 tons net register are, however, able to compete in the open lake trade, because they are better adapted to the package freight business, and they besides have the trade through the Welland and St. Lawrence canals entirely to themselves.

Vessels Carrying Canadian Grain.—Two special statements were prepared from the official records at Fort William and Port Arthur covering the seasons of 1911-12-13, the one containing the name, nationality, and registered tonnage of each vessel carrying grain from those ports with the details of its cargo, the date of clearance and the port to which it sailed, and the other containing the name, nationality, capacity, and amount of cargo of each vessel delivering coal to those ports, with the date on which each cargo was entered for unloading. Compilations of details in these two statements are interesting in connection with a study of the real nature of the traffic in the lake Superior trade and of the competition between Canadian and United States vessels.[1]

The following table shows the tons of grain carried from Fort William and Port Arthur in the season of 1913 by Canadian vessels and by United States vessels, in each case classified according to net registered tonnage:—

VESSELS Carrying Grain from Fort William-Port Arthur—Season of Navigation, 1913 (Classified).

Registered Tonnage (Between).	Number of Vessels.	Amount Carried (Short Tons).	Percentage of Total Carried.
Canadian Vessels:—			
1 and 1000	15	111,145	4·10
1000 " 2000	67	1,582,678	58·45
2000 " 3000	11	429,386	15·85
3000 " 4000	1	120,720	4·46
4000 " 5000	5	463,791	17·13
5000 and over			
Total	99	2,707,715	
United States Vessels:—			
1 and 1000	25	228,636	8·91
1000 " 2000	17	267,075	10·41
2000 " 3000	74	935,165	36·46
3000 " 4000	38	596,316	23·24
4000 " 5000	31	513,336	20·00
5000 " 6000	2	25,052	0·98
6000 and over			
Total	187	2,565,880	

It will be noted that there were practically twice as many United States vessels engaged as Canadian vessels, and that the United States vessels were on the average very much larger in capacity, yet the United States vessels did not carry as much grain as the Canadian vessels, the explanation being found in the fact that a majority of the United States vessels made only one trip with Canadian grain in the season,

1 Specially compiled from statistics at the port of Fort William-Port Arthur, courtesy Board of Grain Commissioners.

while many of the Canadian vessels were steadily employed in carrying grain throughout the season, one Canadian vessel having taken as many as twenty-eight loads.

The number of loads per month taken by Canadian and United States vessels is as follows:—

LOADS of Grain per Month from Fort William and Port Arthur.

Month.	Canadian Vessels.	United States Vessels.
April	43	7
May	122	32
June	96	19
July	107	11
August	74	7
September	83	22
October	149	89
November	145	110
December	30	55
Totals	849	352

These figures illustrate the irregularity of grain shipments. Canadian vessels, on the average, carried 8·57 loads for each vessel engaged, while the United States vessels carried but 1·88 loads per vessel. The Canadian grain fleet was apparently engaged to something approaching full capacity only in the months of May, October, and November. In October, and particularly in November, shipments direct all-water to Montreal tend to fall off and the boats double up on the shorter routes and can thus make more trips.

The large proportion of Canadian vessels under 2,000 tons net register, 67 out of 99, or more than two-thirds, is notable. These vessels carried 62·55 per cent of the grain carried by Canadian vessels, or 32·12 per cent of the total grain carried by all vessels. Vessels of this size can use the Welland and St. Lawrence canals, but these vessels actually carried from Fort William and Port Arthur more than four times the grain that travelled direct to Montreal by water, and they therefore successfully engaged in the open lake competitive traffic, and, as pointed out, are probably able to do this because of the return package freight business.

By comparing the list of vessels carrying grain from Fort William and Port Arthur with the list of vessels carrying coal to those ports, it is possible to determine the direct relationship between the coal and grain traffic in so far as those ports are concerned. It might be supposed that if Fort William and Port Arthur received 4,217,248 tons of coal and shipped out 5,273,595 tons of grain, the vessels that unloaded coal would simply move from the coal dock to the grain elevator and fill up with grain for the return trip. The load factor offered by these two bulk commodities in that year at these ports was extraordinarily favourable. As a matter of fact, however, there was only a slight relationship between these two traffics in so far as United States vessels were concerned. United States vessels carried 3,609,496 tons of coal to Port Arthur and Fort William, and United States vessels carried 2,585,880 tons of grain from those ports, but only occasionally did the vessel that brought coal load grain, or the vessel that went east with grain return with coal. Only 397,413 tons of the total coal load of United States vessels to those ports, or 11·10 per cent, can thus be traced into a direct relationship with the grain-carrying traffic of United States vessels from Port Arthur and Fort William. Most of the United States vessels, after unloading coal, sailed light to load iron ore or some other freight at other ports. Other vessels, mostly light, came in to load grain. In November and December, after

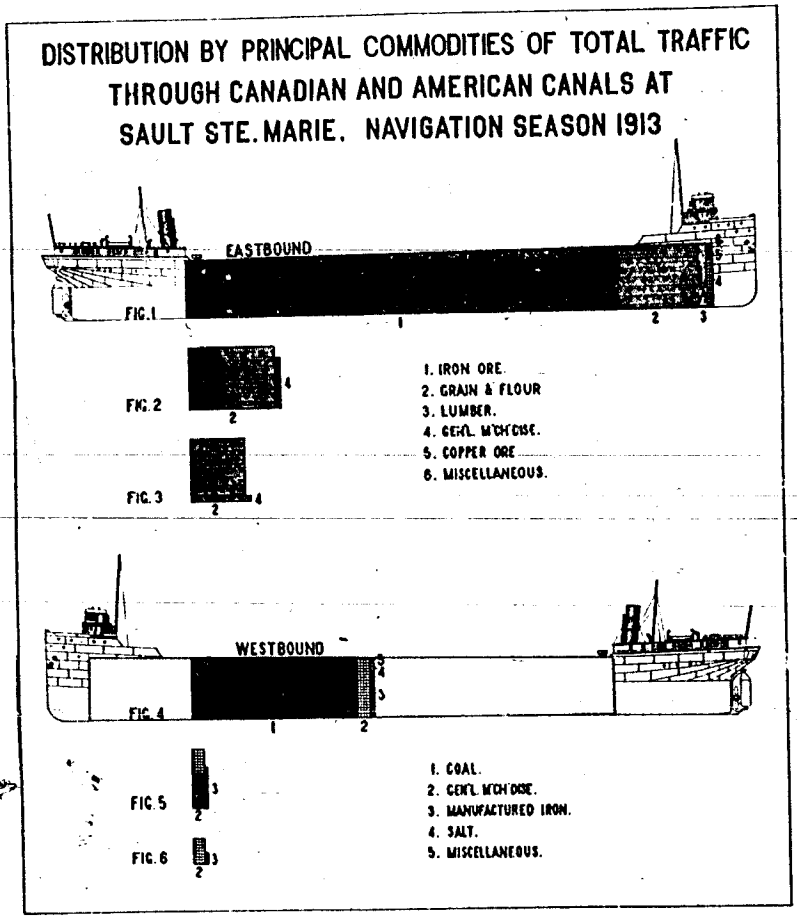
the ore trade falls off, there is a much more direct relationship between the two traffics. Of the 637,640 tons of coal carried to Fort William and Port Arthur by Canadian vessels, no less than 389,873 tons, or 64·11 per cent, was carried by vessels that immediately loaded grain, or had returned with coal after carrying down a cargo of grain. This means that the portion of the Canadan grain fleet, consisting of bulk freighters, or at least such bulk freighters as were on the route to lake Erie ports, pretty regularly loaded coal back. The facts, particularly with regard to the United States vessels, tend to show that the movements of lake vessels are determined by general conditions rather than by the traffic conditions peculiar to individual ports. Iron ore and coal probably dominate the whole position, the remaining traffic being more or less incidental, except with the smaller vessels. The participation of United States bulk freighters in Canadian traffic, and their actual or potential competition in this traffic, must largely be determined by conditions in the iron ore and coal traffic.

As nearly all the iron ore traffic falls to United States vessels under the coasting laws, Canadian bulk freighters must so adjust their loads of grain and coal as to be able to meet the competition of United States vessels on the basis of the standards set in the iron ore and coal trades. In November about one-third of the United States fleet is laid up or diverted to other trades, and so during that month and in December plenty of United States tonnage has been available for the Canadian grain traffic when rates have been made sufficiently attractive.

TOTAL TRAFFIC BY PRINCIPAL COMMODITIES.

In diagram 6, figures 1 and 4, there is presented graphically an analysis of the total eastbound and the total westbound traffic through the Sault Ste. Marie canals,

DIAGRAM No. 6.



according to the commodities carried. The figures for the season of navigation of 1913 are as follows:—[1]

[1] Appendix, Table 17, p. 102, Statistics, 1911-14.

	Tons.	Per cent.
Eastbound—		
Iron ore	48,076,977	81·20
Grains, including flour	9,632,792	16·26
Lumber	978,697	1·65
General merchandise	403,068	·69
Copper	85,378	·14
Building stone, sand, pig-iron, etc	28,941	·04
Total	59,205,853	
Westbound—		
Coal	18,622,938	90·84
General merchandise	1,367,792	6·66
Manufactured iron	350,152	1·85
Salt	108,997	·53
Miscellaneous	32,612	·15
Total	20,512,491	

Iron ore constitutes 81·20 per cent of the total combined eastbound traffic of both countries, while coal constitutes 90·84 per cent of the combined westbound traffic. The combined eastbound shipments of grain and flour rank third in total quantity, but the iron ore traffic is nearly five times as great as the grain and flour traffic, and the coal traffic is almost twice as great. Other classes of commodities, however valuable they may be in themselves, are almost insignificant when quantities are compared. It may almost be said that traffic in the lake Superior trade consists of iron ore in one direction and coal in the other direction, with occasional loads of grain and flour and a little miscellaneous cargo. Both the iron ore and the coal are United States products, and most of the iron ore is carried to lake Erie ports as being nearest to points of consumption, while the coal is shipped from the same ports as being most convenient to points of production. These facts account for the enormous vessel tonnage in the lake Superior trade, for the fact that the shipping is so largely of United States register, and for the fact that 83·48 per cent of all the traffic passing through the Sault Ste. Marie canals is in the trade with lake Erie.

From the standpoint of the proposed Georgian Bay canal it will be important to determine, in the first place, what proportion of the existing traffic in the lake Superior trade might be diverted to the new route or might be beneficially affected by the new route to the national advantage of Canada, and in the second place, what increase in traffic is likely to occur in the future in each of the principal classes of commodities, or to what extent the new route might facilitate such increase by rendering new markets available or decreasing the cost to present markets.

If nearly all the iron ore shipped in 1913 (fig. 1, No. 1) was destined to industrial plants within the distributing areas controlled by Chicago, Gary, and the lake Erie ports, then that portion of the traffic could not have been diverted to a Georgian Bay canal. Most of the lumber (fig. 1, No. 3) was United States coasting traffic, and in any case would not likely have moved down the Ottawa valley in competition with the lumber of that district. The copper ore (fig. 1, No. 5), like the iron ore, was destined to industrial plants out of the competitive range of the proposed canal; and the miscellaneous traffic (fig. 1, No. 6) was largely building stone and sand, and, therefore, strictly local in character. If, after careful investigation, it should be decided that the traffic that existed in 1913 in the above classes of goods could not have been diverted, then there would be left for further consideration the classes consisting of grain and flour and general merchandise (fig. 1, Nos. 2 and 4). The quantities represented by these two classes would compare with the total traffic as fig. 2 with fig. 1. The shaded portions of fig. 2 (grain and flour, 3,543,134 tons; general merchandise, 359,283 tons) represent the United States coasting traffic in these two classes, with this exception that grain grown in Canada but shipped from Duluth-Superior is in this case not included as United States traffic. The spring wheat grown

in the United States and shipped from Duluth-Superior is, unless with crops of more than average size, nearly all milled in the United States, little being exported to Europe in the form of wheat. The surplus of winter wheat shipped from Chicago is thus rather more open to the competition of Canadian routes than is the wheat shipped from Duluth-Superior. If, now, it be desired to compare the balance of the traffic not subject to these doubts or limitations with the total traffic, fig. 3 (grain and flour 6,039,658 tons; general merchandise, 44,785 tons), in which the shaded portions of fig. 2 are left out, may be compared with fig. 1.

Treating westbound traffic in the same way, it is clear that the coal shipped in 1913 (fig. 4, No. 1), being Pennsylvania coal, would not have used a Georgian Bay canal. The salt (fig. 4, No. 4), in so far at least as it was Canadian traffic, was probably shipped from the Windsor district; and the miscellaneous (fig. 4, No. 5) was in any case unimportant. The balance of the traffic consisted of general merchandise and manufactured iron as in fig. 5, of which the shaded portions (general merchandise, 834,932 tons; manufactured iron, 263,313 tons) were United States coasting traffic. With the shaded portions left out, the comparative quantities (general merchandise, 532,860 tons; manufactured iron, 116,809 tons) would appear as in fig. 6.

This treatment is, of course, merely suggestive, and the relative quantities in the shaded and unshaded portions of figs. 2 and 5 are, with the details now available, only very rough approximations. By the careful application of some such method it should, however, be possible to arrive at reasonably accurate quantities of each class of commodities that should appear in figs. 3 and 6; that is, it should be possible, in respect to the traffic of any particular year, to segregate the quantities and classes of freight for which a Georgian Bay canal, if in existence, might have been able to compete. After excluding traffic necessarily controlled by United States routes, there should, in the second place, be excluded such traffic as would necessarily be controlled by the present Canadian lake-and-rail routes, and the water route by lake Erie and lake Ontario, because such traffic originated at or was destined to points which could not be conveniently reached by the Georgian Bay Canal route. What would be left after this second exclusion would be the traffic that could be competed for by the Georgian Bay Canal route as against the existing Canadian routes, and in the case of export or import traffic, as against the competition also of certain United States routes and of the route through the west coast around by the Panama canal, and of that by way of Hudson bay. A consensus of opinion might even be reached as to the proportion of this competitive balance which might fall to the Georgian Bay canal, and as to the extent to which such canal might affect the freight rates and facilities on the other routes.

TRAFFIC TO AND FROM LAKE MICHIGAN.

Lake Michigan carries a large traffic that does not in its course pass through the Sault Ste. Marie canals, and has not therefore entered into the statistics just examined. A few general facts may here be presented to indicate broadly the character of this traffic and the routes by which it moves. The traffic of the port of Chicago forms the greater part of the traffic of lake Michigan, and may be taken as representative.[1]

In the season of 1913 the total traffic of the port of Chicago, in and out, amounted to 12,605,201 freight tons. For comparison with lake Superior ports it may be stated that in that year the port of Duluth-Superior had a freight tonnage of 40,875,416 tons, and Fort William-Port Arthur a little over 12,000,000 tons. The principal commodities received at and shipped from Chicago were:—

	Short Tons.
Received—	
Iron ore	5,583,581
Coal	2,018,610
Merchandise, unclassified	1,526,090
Shipped—	
Grain, flour and mill stuffs	1,906,407
Total	11,034,898

The balance of 1,570,303 tons consisted of receipts of grain, lumber, salt, sugar, manufactured iron, etc., and shipments of merchandise, manufactured iron, and other classified articles. The ratio of total freight tons received to total freight tons shipped was about 4 to 1. The iron ore was from lake Superior and from Escanaba or other lake Michigan ports. In the trade between lake Michigan and eastern lake districts the bulk commodities were grain eastbound and coal westbound, with some general cargo in both directions. In this trade more tons moved westbound to Chicago than eastbound from Chicago, but if an accurate analysis could be made the difference in the total might be found comparatively small. Traffic, however, was less evenly distributed throughout the season than in the lake Superior trade, the arrivals and departures of vessels curving upward to a peak in July and August, and then following the same curve downward.

Chicago has traffic with Canadian ports in grain eastbound and package freight in both directions. In 1913, Chicago shipped grain and flour to Canadian ports as follows:—[2]

LAKE Shipments to Canadian Ports, 1913.

From Chicago to	Flour.	Wheat.	Corn.	Oats.
	Bbls.	Bush.	Bush.	Bush.
Depot Harbour	78,000	32,000	1,537,000	2,315,000
Midland	.....	58,000	1,520,000	382,000
Tiffin	.....	266,000	2,351,000	189,000
Collingwood	.....	.....	3,432,000	.....
Port Colbourne	.....	656,000	.....	.....
Kingston	.....	.....	184,000	.....
Prescott	.....	.....	695,000	.....
Montreal	.....	1,009,000	45,000	.....
Other Canadian ports	.....	.....	55,000	.....
Total	78,000	2,621,000	9,819,000	2,836,000

[1] Annual Report of Chicago Board of Trade.

[2] Appendix, Table 21, p. 106, Statistics, 1911-14.

The greater part of these shipments merely passed through Canada in transit to the Eastern States; a part was exported from Canadian ocean ports; and a small balance, particularly of corn, was retained in Canada for consumption. It is an interesting fact that Canadian lake-and-rail lines compete directly with United States lake-and-rail lines for traffic between the Eastern States and the North Central and Western States. Canadian ports on Georgian bay thus under certain conditions compete with Buffalo, even although some of the traffic may be carried by rail across the border at Niagara Falls. Other portions of this in transit traffic cross the border at such points at Prescott and points on the railway lines south of Montreal. Of the above totals of grain the following amounts are reported as in transit shipments which passed back again into the United States:—[1]

In Transit Shipments, 1913—		
Flour	brl.	15,367
Wheat	bush.	59,500
Corn	"	5,573,538
Oats	"	3,076,636

Of the shipments from Chicago to Canadian lake ports which were destined for export through Canadian ocean ports the principal item was wheat, 2,375,724 bushels, an amount corresponding with the shipments to Port Colborne and to Montreal. In certain years the shipments of grain from Chicago for export through Canadian ocean ports are very much larger than they were in 1913. Reduced to tons the total grain and flour shipped from Chicago to Canadian ports amounted in 1913 to 409,218 tons.

Package freight moves in both directions through Canadian lake ports in transit between Chicago and the eastern states and between Chicago and Europe, but the total is not large in tons.

From the statistics of the arrivals and departures of vessels engaged in foreign trade, it is evident that Chicago ships much more to Canadian ports than it receives from Canadian ports; and further that these shipments are heavier in certain months than in others.

VESSELS in Foreign Trade—Chicago District.*

Month.	Arrivals.		Clearances.	
	No.	Tonnage.	No.	Tonnage.
April	2	4,397	13	23,619
May	13	22,072	18	22,314
June	20	31,064	23	38,842
July	22	27,693	34	49,137
August	23	36,388	44	66,655
September	15	23,542	44	85,635
October	21	31,889	38	77,089
November	24	36,157	44	161,496
December	8	20,568	4	18,737
Total	148	235,710	257	543,524

* Chicago District comprises Chicago, Michigan City, Waukegan, Gary and Indiana Harbour.

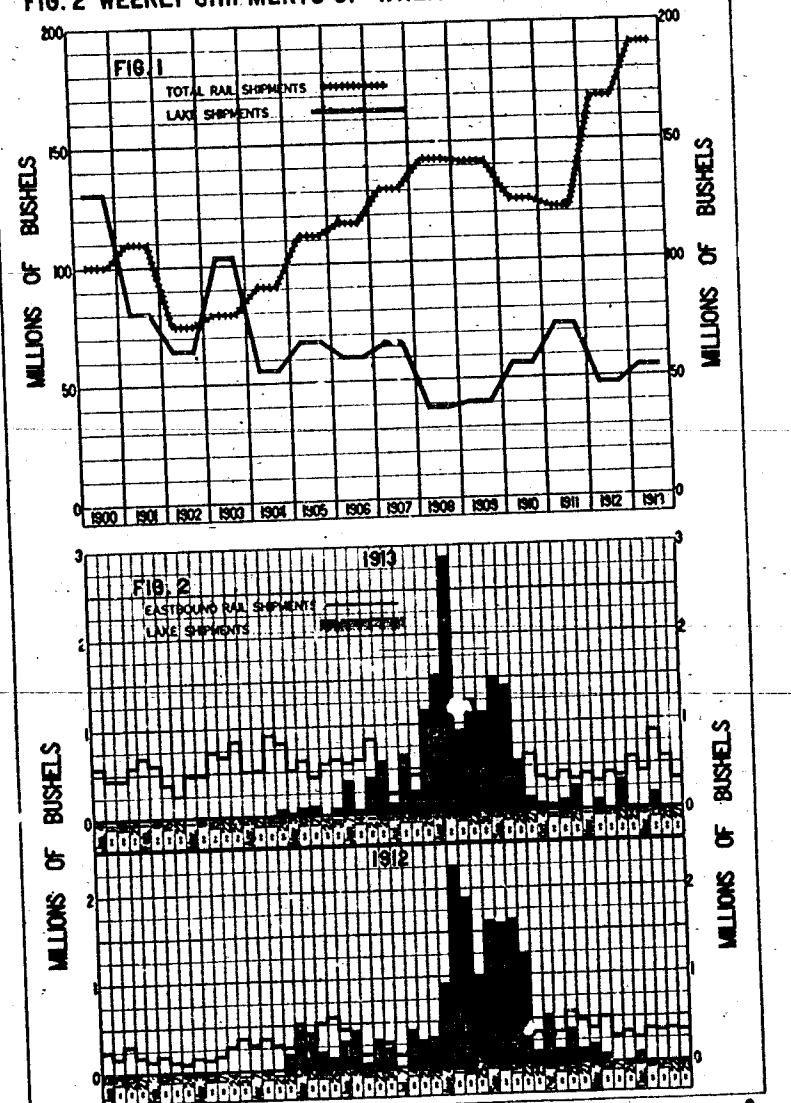
The clearances for Canadian ports were about 1¾ times the arrivals from Canadian ports, and the aggregate registered tonnage clearing was almost 2¼ times

[1] Appendix, Table 22, p. 107, Statistics, 1909-14.

GRAIN SHIPMENTS FROM CHICAGO BY RAIL AND BY LAKE.

FIG. 1 YEARLY TOTALS OF ALL GRAINS 1900 TO 1913.

FIG. 2 WEEKLY SHIPMENTS OF WHEAT ALONE 1912 AND 1913.



the tonnage arriving. The vessels arriving averaged about 1,500 tons net register, and if we assume that these same vessels cleared again for Canada, then the additional vessels loaded for Canadian ports averaged about 3,000 tons net register. Bulk freighters were added to carry the grain, while the regular package freight business was done by the smaller boats. The bulk-freighters did not load back from Canadian ports to Chicago.

While the Canadian lake-and-rail lines are competitors with the United States lake-and-rail lines for Chicago business, the all-rail lines are the strongest competitors of all. As compared with the quantities of grain shipped by rail from Chicago, the shipments by lake have shown a marked relative decline in the past ten years. It would appear that the railways now do the regular grain traffic business and the lake carries the peak of the load.

In diagram 7, two figures are presented in illustration of this development. Fig. 1 shows the total movement from Chicago of all grains for fourteen years, divided into rail shipments and lake shipments, the former with a marked tendency to increase, and the latter with a tendency to decline, until in 1913 about 3½ times as much was shipped in all directions by rail as was shipped by lake. In figure 2 the shipments of wheat by the eastbound rail lines, alone, are compared for the years 1912 and 1913 with the shipments of wheat by lake. Most of the wheat shipped eastbound by rail was destined to points that could be reached also by the lake-and-rail lines, and the traffic in this figure is therefore largely competitive traffic. It will be noted that the eastbound rail lines do a fairly steady business every week in the year, while the lake shipments are crowded into a few weeks from the end of July to the middle of September. The lake in those years was extensively used for only about one-third of the navigation season. It may not be without significance that the peak of the lake wheat load from Chicago corresponds with the slack period in grain shipments from Fort William and Port Arthur. In 1913 the eastbound rail lines from Chicago carried 27,933,000 bushels of wheat, while the lake carried only 16,173,690 bushels; in 1912, shipments by lake were a little larger than shipments by rail, the quantities being: rail, 16,680,800 bushels; and lake, 17,523,384 bushels.

In every class of goods received and shipped by Chicago, even coal, and with the one apparent exception of salt, the rail lines have succeeded in securing the larger share of the traffic. By lake Chicago received 1,212,687 barrels of salt in 1913, and by rail, 950,058 barrels.

What proportion of the traffic now passing between Chicago and Canadian ports might be diverted to a new route such as the proposed Georgian Bay canal? What are the possibilities of increasing the trade between lake Michigan and Canadian ports? On what basis should the value to Canada of the diversion of the merely in transit traffic be measured? Canada at present supplies no return bulk traffic for lake Michigan, coal westbound now dominating the lake Michigan trade. How could the proposed new route establish a competitive load factor?

Freight traffic in the lake Superior and the lake Michigan trades constitutes nearly all the present waterborne traffic which might be affected by the building of a Georgian Bay canal. There is, in addition, a certain amount of traffic to and from ports on Georgian bay and lake Huron and the town of Sault Ste. Marie which might be competed for by the proposed new canal, but in the total this traffic is not large. The immediate purpose of this section of the present report is met by the setting forth of the main features of the existing traffic by water.

Other interesting and important aspects of the problem remain for future examination. From the traffic returns of the Welland and St. Lawrence canals a great deal of information can be gathered as to the nature and distribution of the traffic now using the eastern section of the existing water route. There is local traffic on this part of the route as well as through traffic. To what extent has the local traffic developed? Railways across southern Ontario compete directly with this water route

as they would with a Georgian Bay canal. What do the facts indicate as to the ability of the railways to secure traffic under such competitive conditions? What changes may reasonably be expected from the completion of the new Welland canal? What is the theoretical traffic capacity of the present St. Lawrence canals? How should costs by the Welland and St. Lawrence canals compare with costs from Buffalo to New York by the new Erie canal and costs by the St. Lawrence canals with costs, by canal, from Oswego to New York?

Before attempting a study of these matters of detail, relating particularly to the mechanical ability of the railways and of other canals to compete with the proposed Georgian Bay canal, the general treatment of the subject will be continued,—first, by raising the question of the probable development of traffic in the future; and second, by following the present export traffic after it leaves the Great Lakes waterway to see under what general conditions it becomes part of the great traffic of the ocean.

FUTURE DEVELOPMENT OF TRAFFIC.

It is not possible to rest the case for the Georgian Bay canal after arguing alone on the traffic conditions of the present. In the year 1913 was found the greatest volume of traffic between the East and the West in North America which has yet been recorded. If it should seem that Canada, had the Georgian Bay been then completed, might have derived from the traffic of that year an additional benefit commensurate with the cost of the canal, then an effective argument for immediate construction could be offered. Nevertheless, it would still be wise to consider the general causes and tendencies that affect the development of traffic. If, on the other hand, Canada's probable share of the traffic of 1913 might not seem to warrant a further large national investment, it would be necessary to inquire whether there might not be reasonable expectation that traffic would so increase year by year that the investment would soon become profitable, and would accordingly be a sound business proposition.

With respect to each class of goods transported in 1913, there should, therefore, be an inquiry with a view to determining the possibilities; first of the maintenance of the present volume of traffic, and second, of the increase of this volume and particularly of such increase as might come within the competitive influence of a Georgian Bay canal. Taking, for example, iron ore and copper ore eastbound, the probabilities of the continued shipment of the present immense tonnage should be considered, because if this traffic were greatly reduced, either by failure of the supplies of raw material or by the opening up of more favourable sources of supply for eastern industrial plants, or were diverted by the establishment of a centre for the iron industry at some point further west, then the whole economic structure of lake traffic would be altered. If, again, new markets for this iron and copper ore could be opened up, because of the construction of a new deep waterway to the sea or, at least, in such districts as would render a Georgian Bay canal a competitive route, then this ore traffic would become a factor in deciding the economic feasibility of the proposed canal, and it would remain only to set a value in national advantage on the passage of such traffic through Canadian channels.

The problem of coal traffic is perhaps even more important. If any large section west of lake Superior is likely to continue dependent upon supplies of eastern coal, and if the Pennsylvania coal fields can control that market, then lake Erie must retain a strong attraction for shipping. If, on the other hand, it should appear possible to develop a new source of coal supply for the west, such as the Nova Scotia fields, for example, then Canadian routes might supply bulk traffic westbound and greatly improve their competitive position. The traffic in general merchandise and manufactured articles may be expected to increase in some relation to the increase in population. It should also be inquired whether certain classes of goods not now shipped by the lakes, such as meats, provisions, and packing-house products, of which Chicago alone ships eastbound by rail over one million tons per year and some of it to Montreal for export, might not under practicable conditions be made to contribute tonnage to the new water route.

Wheat and Flour.—Because the movement of grain and flour is to-day Canada's greatest traffic problem, and because these products form so large a part of the total freight now apparently open to the competitive influence of a Georgian Bay canal, it may be well first to study the possibilities of this traffic in some detail. For the sake of simplicity of treatment, the present study will be confined to wheat, or wheat and flour alone. Any principles discovered or methods evolved can then be applied to other grains.

How much wheat will western Canada be prepared to offer for shipment five, ten, or twenty years hence? What general conditions will set the limits to the production and shipment of wheat? What proportion of the total wheat traffic will be destined to districts or countries that could be reached on favourable terms by a route through a Georgian Bay canal?

To give an estimate of the quantity of wheat there might be for shipment from western Canada in any future year is to make a guess. Will it be 500,000,000 bushels? Will it be 1,000,000,000 bushels? Or will it not be any greater in ten or twenty years than it was in 1913? It will depend upon conditions. Some of these conditions may already be recognizable. If a large wheat traffic should be deemed necessary in order to make a new canal economically feasible, it is clearly desirable to select such determining conditions as can be agreed upon and apply them as tests to the guesses that may be made.

One general determining condition will be the number of acres of land in western Canada capable of growing wheat; but as there is more of such land than can, by any stretch of probability, be turned to account within a generation or two, this condition will not impose any practical limitations. Good wheat land need not grow wheat; it may be used for other crops, or it may continue to grow prairie grasses.

A second general condition will be the extent of the world's demand for wheat, and the price it is prepared to pay for it. Assuming an abundance of good land and labour enough to cultivate it, the limitation upon the quantity of wheat actually raised will probably be found in market conditions. What markets could be reached by way of a Georgian Bay canal? What will be the demand of these markets, and what will be the tendencies affecting price?

From the standpoint of a Georgian Bay canal, the Orient may be excluded from the markets to be considered, because what wheat and flour western Canada may ship to the Orient will undoubtedly go out by the west coast. If the United States should cease to produce enough wheat for its own needs, only a portion of such western Canadian wheat as might be purchased by the New England states would take the long eastern route to Montreal before crossing the border. On this continent a Georgian Bay canal could compete for shipments to the markets of eastern Ontario, Quebec, the Maritime Provinces, and the New England states, but these markets, while valuable, would not call for the creation of new transportation facilities. The important market, obviously, is Europe. In the past, out of every 7 bushels of wheat and flour shipped by all exporting countries, Europe has absorbed a little over 6 bushels. It is the only great market for breadstuffs, and in shipments to this market from western Canada a Georgian Bay canal might prove a competitive factor.

If the European market for wheat and flour is thus likely to prove one of the conditions mainly determining such future shipments of wheat as are of concern to the problem of a Georgian Bay canal, then the probable capacity and the probable methods and prices of this market should be applied as tests to the estimates of such shipments. Before attempting to forecast future conditions in the European market, it will be desirable to understand the present conditions. For this purpose the answers to four questions, at least, should be clearly worked out:—

(1) How much imported wheat and flour does Europe now buy?

(2) How does Europe now buy this wheat and flour, that is, how are its purchases distributed throughout the year?

(3) Where does Europe now buy this wheat and flour?

(4) What price tendencies are now observable in connection with the European market?

Shipments to Europe.—Diagram 8 graphically presents the answers to questions 1 and 2, and illustrates certain other interesting points as well. The answer to question

3 is presented in diagram 9. For the purpose of these diagrams, Broomhall's statistics of the weekly shipments of wheat and flour (included at its equivalent in bushels of wheat) have been taken for the years 1905 to 1913, inclusive. The actual shipments in the first week in each of the above nine years have been added together and divided by nine to arrive at the average first week's shipments during that period, and so with each of the other weeks of the year. The drawings thus contain fifty-two columns, and represent the average movement of wheat and flour in each week of the year for nine years.[1]

The quantities of wheat and flour shipped by exporting countries are the quantities which are received by importing countries. These diagrams may, therefore, be looked at from the point of view either of exports or of imports. The definite dates given are the dates of shipment from the countries possessing surpluses, but the quantities represent the needs and the purchases of importing countries more truly than they do the surpluses of exporting countries.

In diagram 8, fig. 1, taken as a whole, can be seen the average quantities of wheat and flour shipped from all exporting countries in the world to all importing countries in the world, while from the base to the superimposed white line can be found the quantities shipped weekly to Europe from all exporting countries. The importing world purchased on the average in the above period 562,184,000 bushels of wheat and flour per year, of which the importing countries of Europe took 484,104,000 bushels, or 86·11 per cent.

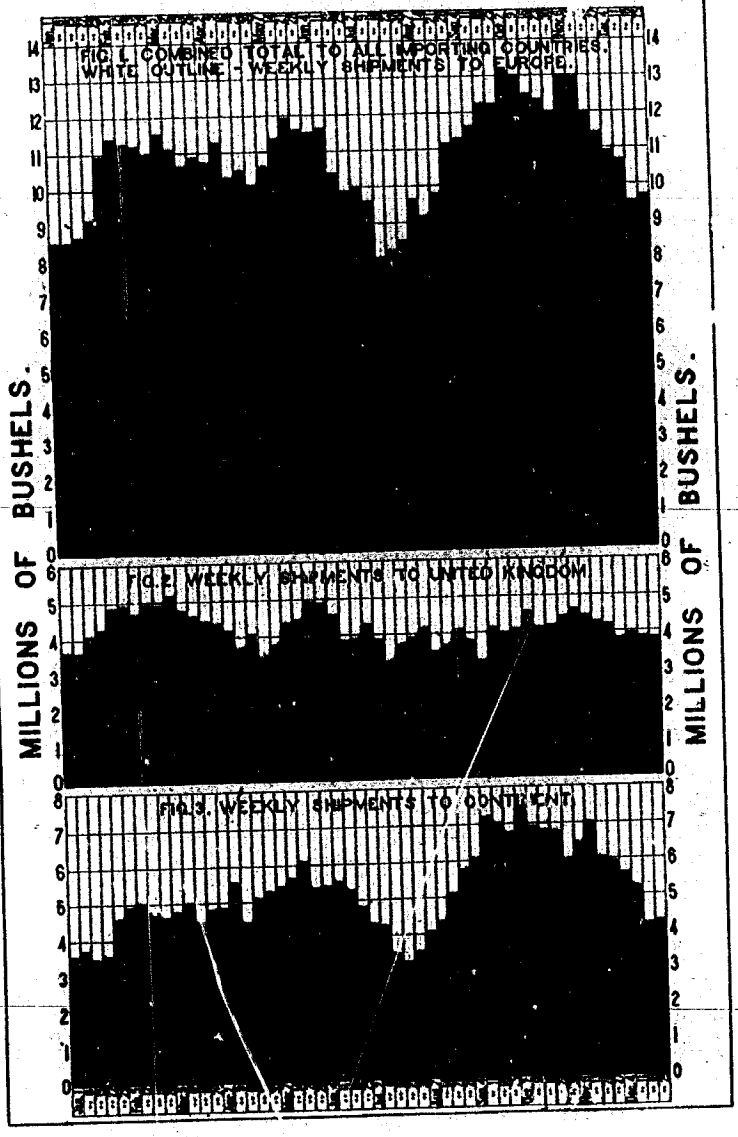
These latter figures, therefore, represent the capacity, before the war, of the European market for imported wheat and flour. It is interesting to note that during the first year of the war, or from August 1, 1914, to July 31, 1915, there was shipped to European countries, 477,344,000 bushels of wheat and flour, or a little less than the average of the previous decade, the increased purchases of some countries being offset by the partial embargo on imports by Germany and Austria.

The wheat grown in the world between 1905 and 1913 averaged about 3,400,000,000 bushels per year, so that only about 16 per cent entered into international commerce. Europe, as a whole, grew four times as much as it imported, and even the countries of Europe showing net imports grew twice as much as they imported. The following table gives the production of wheat and the net imports of wheat and flour of the principal importing countries of Europe for a representative year, 1912:—

Country.	Year.	Wheat Crop.	Wheat and Flour net imports during subsequent 12 months.
		Bushels.	Bushels.
Austria-Hungary	1912	254,240,000	56,000
Belgium	1912	15,289,000	50,184,000
Denmark	1912	3,760,000	19,520,000
France	1912	333,600,000	44,952,000
Germany	1912	160,240,000	68,608,000
Holland	1912	4,600,000	17,520,000
Italy	1912	165,600,000	72,512,000
Norway	1912	312,000	3,600,000
Portugal	1912	5,600,000	4,000,000
Spain	1912	112,000,000	2,936,000
Sweden	1912	7,808,000	9,003,000
Switzerland	1912	3,176,000	21,904,000
United Kingdom	1912	57,400,000	238,096,000
Totals		1,123,616,000	543,896,000

[1] Appendix, Table 23, p. 108, Statistics.

WEEKLY SHIPMENTS OF WHEAT AND FLOUR
AVERAGED FOR 9 YEARS. 1905 TO 1913.



Figs. 2 and 3 in diagram 8 show the division of European imports into quantities imported by the United Kingdom and quantities imported by the continental countries of Europe. The United Kingdom is the largest single importing market in the world, and during the period under review it imported 217,424,000 bushels of wheat and flour per year, or 44·91 per cent of the total imports of Europe.

Coming now to the question of the distribution throughout the year of European importations of wheat and flour, it is manifest from the diagram that there is a tendency towards evenness of distribution. Breadstuffs are consumed day by day throughout the year in approximately the same quantities, and the fundamental demand, therefore, tends to be steady. For some reasons the importing world has not considered it practicable or profitable to import in one or two brief periods a total year's requirements of wheat and flour, perhaps partly because to unnecessarily store imported grain in Europe would be to unnecessarily pay interest on a sum equal to all costs, charges and intermediate profits involved in the transfer of the grain to Europe, whereas grain can be stored at the point of production for the interest on farm costs alone; partly because the consequent congestion of traffic would throw an ill-balanced load on the world's transportation systems, and make freight costs too high; and partly because such a load would be as difficult to finance as to transport.

If the world's shipments had been absolutely even, the weekly quantity would have been 10,811,000 bushels. The smallest week's average shipments, 8,040,000 bushels in the week of July 16, was only 21·5 per cent below this general average; and the greatest week's shipments, 13,136,000 bushels in the week of October 2, was only 25·63 per cent above the general average. As the contingencies are innumerable, this is not, after all, a very great divergence from the straight line. When longer periods than a week are considered, the relative differences become smaller. The following are the totals when the year is divided into quarters and halves:—

Average World's Shipments, 1905-13, Total 562,184,000 bushels—

				(bush.)
1st quarter year.	135,224,000			
2nd "	142,048,000	1st half year.		277,272,000
3rd "	131,752,000			
4th "	153,160,000	2nd "		284,912,000

Average Shipments to ex-European Countries, 1905-13, Total 78,080,000 bushels—

				(bush.)
1st quarter year.	19,368,000			
2nd "	19,224,000	1st half year.		38,592,000
3rd "	18,528,000			
4th "	20,960,000	2nd "		39,488,000

Average Shipments to Europe, 1905-13, Total 484,104,000 bushels—

				(bush.)
1st quarter year.	115,856,000			
2nd "	122,824,000	1st half year.		238,680,000
3rd "	113,224,000			
4th "	132,200,000	2nd "		245,424,000

Average Shipments to Great Britain, 1905-13, Total 217,424,000 bushels—

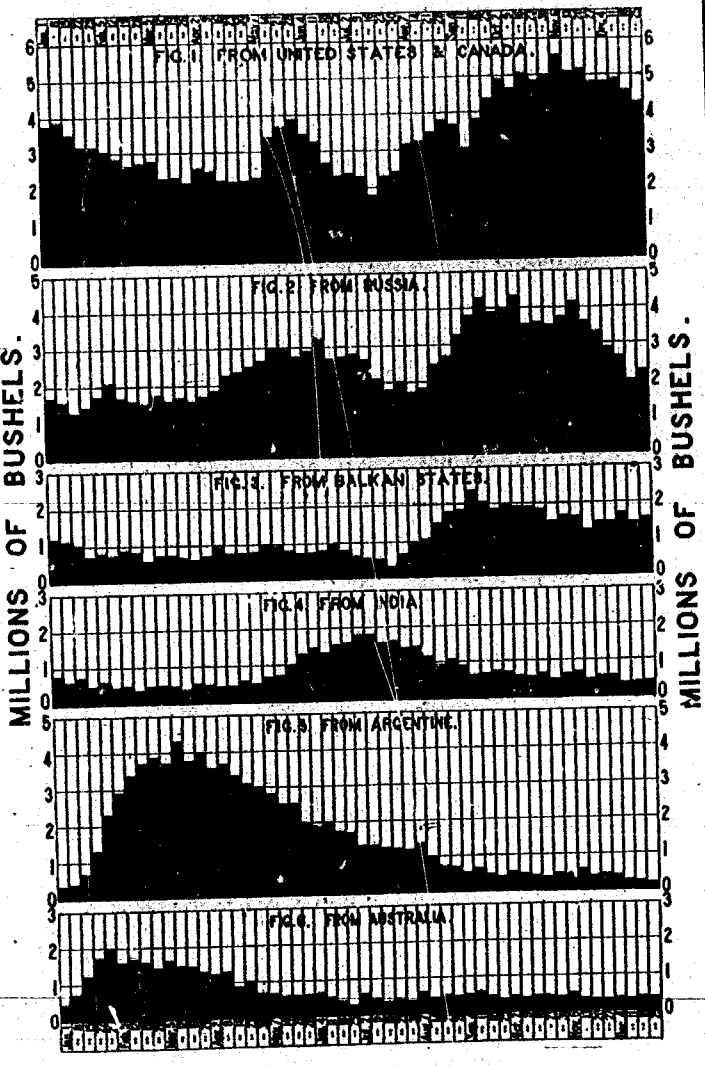
				(bush.)
1st quarter year.	59,040,000			
2nd "	54,392,000	1st half year.		113,432,000
3rd "	49,672,000			
4th "	54,320,000	2nd "		103,992,000

Average Shipments to Continent of Europe, 1905-13, Total 269,616,000 bushels—

				(bush.)
1st quarter year.	57,328,000			
2nd "	68,568,000	1st half year.		125,896,000
3rd "	65,152,000			
4th "	78,568,000	2nd "		143,720,000

These figures confirm the substantial evenness of distribution visible to the eye in the diagram. Shipments to ex-European countries were remarkably regular. Shipments to the continental countries of Europe temporarily declined about the time the new European crop was ready for the market, and the average was adjusted a little later by exceptionally heavy purchases from the new crop of the exporting coun-

WEEKLY SHIPMENTS OF WHEAT AND FLOUR
SHOWING QUANTITIES FROM CHIEF EXPORTING COUNTRIES
AVERAGED FOR 9 YEARS. 1905 TO 1913.



tries of the northern hemisphere. This causes the irregularity in the diagram that is most noticeable. The United Kingdom purchases most heavily in the first quarter of the year, and the continent in the last quarter.

Sources of Supply.—Diagram 9 sets forth the average weekly contributions of wheat and flour from the chief exporting countries to the totals which have just been considered.[1] In most cases the statistics used in this diagram represents shipments to all countries, but the shipments from India and from the Argentine are shipments to Europe alone. As the shipments to ex-European countries are so even week by week, it may for all practical purposes be said that this diagram shows how each of the principal grain exporting countries sends supplies to Europe, that is, how Europe buys from each of these countries.

Beginning at the bottom of the diagram with Australia (fig. 6), it will be noted that shipments are heaviest in the first three months of the year, immediately following the Australian harvest, but that a steady export of a moderate quantity is maintained throughout the year.

The Argentine (fig. 5), where the harvest is a little later than in Australia, ships a very large proportion of its whole surplus in February, March, and April, the shipments dwindling off towards the end of the year.

India (fig. 4) ships more heavily in the middle of the year, also just after its harvest, but holds over a fair proportion of its surplus for regular export during the balance of the year.

The Balkan States (fig. 3) ship heavily, but on the whole regularly, during the last four months of the year, but hold over a substantial quantity for shipment during the next spring and summer.

Russia (fig. 2) also ships heavily after its harvest, but holds over a large proportion until the new year. During January, February, and March, certain Russian ports are closed by ice, but nevertheless a substantial and regular export takes place. When navigation is re-opened the volume of export increases, but regularity tends to be preserved. Considering climatic conditions, the export of the Russian surplus would appear to have an exceptionally well-regulated distribution throughout the year.

The United States and Canada (fig. 1) are treated together in commercial statistics. From the two countries combined the heavy shipments begin in August and extend on into the following January. In May a sharp peak is found following the opening of navigation on the Great Lakes and the marketing of "May" wheat. The sharpness of this May peak is in contrast with the broader movement which follows the opening of navigation in Russia. A considerable proportion of this May peak consists of Canadian wheat, which also is largely represented in the shipments during October, November, and December. The exports from the United States, during certain years before the Canadian exportable surplus became large, have been examined, and it would appear that in some years at least there was a greater regularity of shipment than was found on the average between 1905 and 1913.

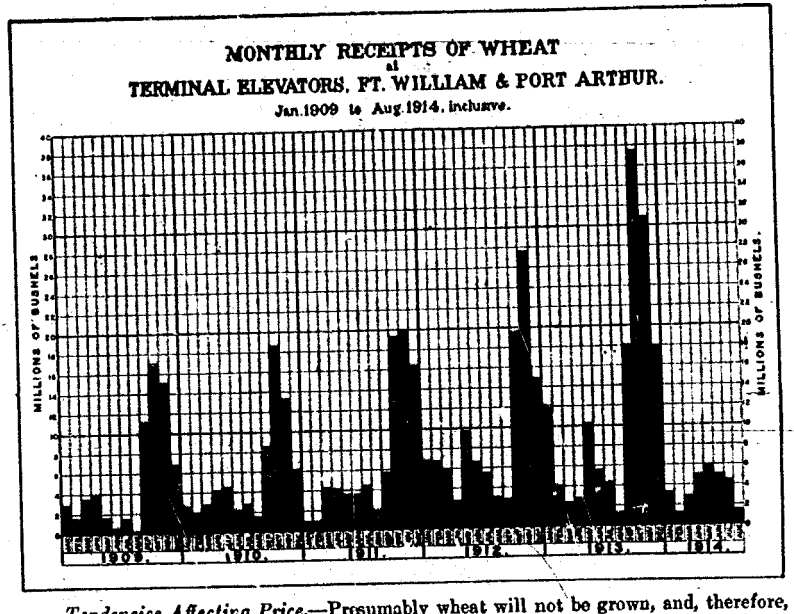
If diagram 9 be now examined in relation to diagram 8 it will be seen that the importing world buys relatively heavily as soon as new crops are threshed, when wheat is intrinsically cheapest or there is the greatest pressure to sell. Taking the shipments to the United Kingdom for special examination, it will be noted that the first bulge in these shipments corresponds with the new crop marketings of Australia and the Argentine; that the second bulge corresponds with the marketing of May wheat in Canada and the United States and with the re-opening of navigation in Russia; that there is a small bulge corresponding with the marketing of the early winter wheat in the United States and in the Balkan states; and that the final bulge corresponds with the spring wheat marketing of the United States, Canada, and Russia. It is at these periods the United Kingdom buys a little more than its average consumption

[1] Appendix, Table 24, p. 109, Statistics.

requirements, probably because it has been found profitable to do so, but it buys in any period only a little more than it requires for consumption, the only storage necessary being such as would carry over the surplus for a few weeks.

If the law of the consuming market be evenness of distribution throughout the year, then it is clear that this law must be recognized by producing countries and must determine to a large extent the volume of production, the methods of marketing and of transportation, and the system of finance of the country which aims to supply any large proportion of the European demand. Any estimate of Canada's probable shipments of wheat and flour to Europe in the future should be tested by the general conditions in Europe and in other producing countries which are suggested by the facts illustrated in these two diagrams.

DIAGRAM No. 10.



Tendencies Affecting Price.—Presumably wheat will not be grown, and, therefore, will not be shipped, unless the price is reasonably satisfactory to the producers. The existence of adequate transportation facilities at moderate cost may tend to improve the net return to the producers, but will not necessarily make this net price sufficient, under all conditions, to justify the production of wheat rather than some other product. No estimate of the volume of future traffic in any article should be accepted until present price tendencies are examined and the probable effects on price of the new assumed volume and of the new conditions proposed to be created have been studied.

What has been the relationship between Canadian wheat quantities and prices, and what tendencies, if any, have developed in connection with Canadian methods of marketing? As it is only in recent years that the Canadian surplus has been large enough to be an appreciable factor in international trade, this inquiry may be confined to the period from the beginning of 1909 to the end of the crop year 1913-14.

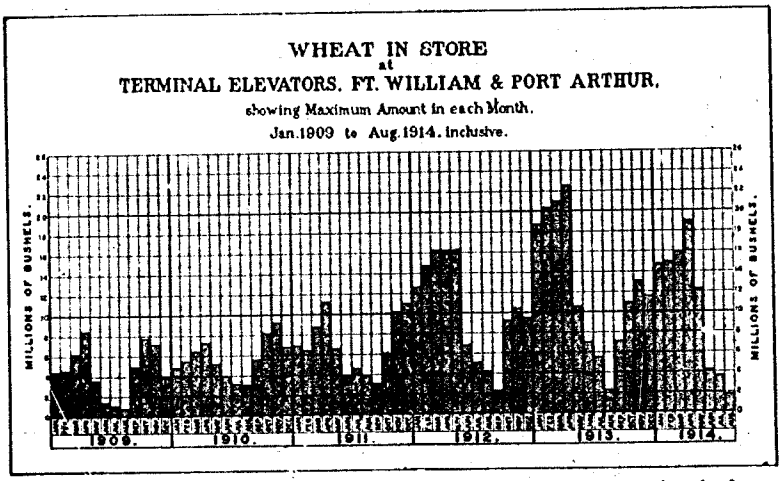
The primary markets of the world are those most directly in touch with, and therefore of most immediate importance to, the world's producers; and it is by the selling

pressure in primary markets exerted against the buying pressure from ultimate consumers that the course of prices is chiefly determined, although this course may be modified by many intermediate agencies.

Canada's great primary market-place for wheat is the terminal elevators at Fort William and Port Arthur. It is there Western Canadian wheat is offered to exporters and to the Eastern Canadian trade. Prices quoted on the Winnipeg Grain Exchange are prices "in store Fort William-Port Arthur." The official records[1] of the receipts from the interior at these terminal elevators, month by month, show the manner in which Western Canada places its wheat on this market.

In diagram 10 these monthly receipts are shown from January, 1909, to August, 1914.[2] The outstanding feature of these receipts is the extreme peak developed in the last quarter of the year. A smaller peak in the month of May has also become clearly

DIAGRAM No. 11.



defined. It is obvious that Western Canada's method of marketing is to sharply thrust forward, immediately after the harvest, the greater part of its surplus, reserving something for a second thrust about the following May. This marketing in extreme peaks is not the accident of one or two years, but evidently the settled practice, becoming more definite year by year as the surplus has increased in volume.

Purchasers take wheat from the elevators every month in the year for shipment eastward by lake or by rail, although rail shipments are small by comparison. As shipments month by month do not strictly correspond with receipts, there is a varying amount always in store in the elevators. Diagram 11 represents the maximum amount of wheat in store in the Fort William and Port Arthur elevators in each month, according to the official weekly reports.[3] The outstanding feature of this diagram is the accumulation of wheat in the elevators during the period in which navigation is closed, that is, between December and April, in which latter month the peak of the year's storage load tends to be found.

The difficulties, or higher costs, of transportation in the winter time may influence some on thus holding over wheat; others may wait in the general hope of higher prices; while the very large private and country elevator interests buy wheat for the purpose

[1] Annual Reports of Winnipeg Grain Exchange.
[2] Appendix, Table 25, p. 110, Statistics, 1909-15.
[3] Appendix, Table 26, p. 112, Statistics, 1909-15.

of carrying it over the winter to ensure earnings on their investments in elevators. What the elevator companies buy they immediately sell again for delivery in some future month, because they desire only a safe investment showing a margin equal to carrying charges for their elevators; and all other owners of wheat who have wished to borrow against their holdings have "hedged," that is, entered into a definite contract for delivery in some future month. Most of these future contracts are for May delivery. The result, therefore, is that, partly because of the close of navigation on the lakes, but largely because of the trading, handling, and financing systems that have developed, a decided market peak accumulates for the month of May, which peak consists of the amount in store in the terminals in April plus the receipts from the interior in May. The second and greater peak of the year consists of the receipts during September, October, November, and December. It is therefore at these two periods of the year, Western Canada offers important volumes of wheat to the world's consumers.

What, now, is the relation between these Canadian market peaks and wheat prices? If diagram 8 be again referred to, it will be perfectly clear that we are here dealing with a method of marketing which is not at all in accordance with the general law of consumption demand. The wheat prices used for this inquiry will be the prices of contract grade wheat at Liverpool, and the prices of cash No. 1 Northern wheat on the Winnipeg Grain Exchange. These latter prices, as explained, are the prices of wheat in store in the terminal elevators at Fort William and Port Arthur, that is, the cash prices, on the spot, of the very quantities under consideration. Liverpool prices are selected because Liverpool is, more nearly than any other, a world market, and because in any case the United Kingdom was the purchaser, during the period under review, of over 91 per cent of all the Canadian wheat exported, and therefore the conditions at a representative market of the United Kingdom are the conditions to which the Canadian surplus actually stood in chief relationship. In the Liverpool market for contract grade wheat the importer can sell under the form of a "future delivery contract," the wheat he has just contracted by cable to buy from the Canadian exporter, and which wheat may at the moment still be in the terminal elevators at Fort William and Port Arthur, where its local market value is the Winnipeg cash price. The two sets of prices selected are therefore more nearly corresponding prices than any others that could be taken.

Before actually comparing quantities and prices, one or two points should be noted in connection with the demand in the United Kingdom for imported wheat. The United Kingdom is the leading importing market for higher grade wheat, and this not only because of the very large quantities of wheat required, but also because the merits of hard wheat are perhaps more generally recognized in the United Kingdom than in other importing European countries. The millers of the United Kingdom, however, do not make a flour of hard wheat alone. Hard wheats of various kinds are mixed with soft wheats of various kinds to make a blended flour. By this means the miller renders himself more independent than he otherwise would be of any one particular kind of wheat. If a special quality of wheat grown in only one country is relatively scarce, or very strongly held, the miller may, from other wheats upon the market, and by slightly altering his proportions, continue to produce a flour which preserves all the main characteristics with which his customers have become familiar. Imported flours can be blended as well as imported wheat. The advantages from the standpoint of the purchaser, of the use of a blended product are obvious, and, whether or not this system remains a permanent business policy, it is a fact that during the years under review the United Kingdom met only a part of its requirements by purchasing hard wheat and hard-wheat flours, and for the balance purchased soft wheat from many parts of the world to supplement its own domestic soft-wheat supplies.

The relationship of Canadian primary marketings to the purchases of the United Kingdom are shown in diagram 12. The solid black portion of this diagram is a repro-

duction of diagram 10 and represents the amount of wheat received each month at the terminal elevators at Fort William and Port Arthur. The hatched column in the month of April, which should be measured from the base of the figure, represents the maximum amount in store in those elevators in that month, being the peak of the accumulations there for May delivery as shown in diagram 11. The dotted line represents the total shipments to the United Kingdom month by month of wheat and flour from all the world, that is, roughly, the total monthly purchases of the United Kingdom from all countries.[1] Taking any one month, and measuring from the base of the figure to the dotted line, the total amount purchased for shipment to the United Kingdom in that month is shown.

DIAGRAM No. 12.

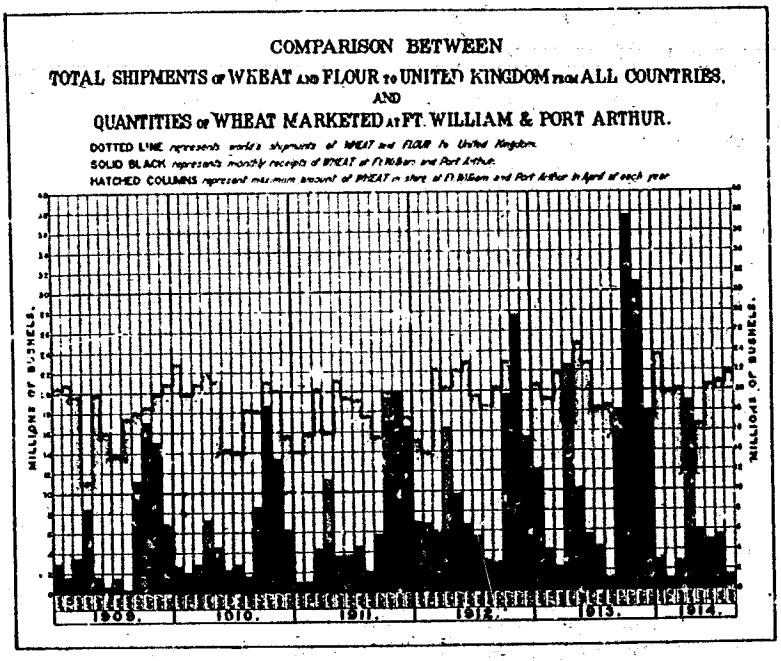


Diagram 12 makes two almost startling revelations. First, that Western Canada sometimes puts upon the market in a month much more hard wheat than the United Kingdom, the only important consumer of its surplus, will purchase of all kinds of wheat and flour from all the world; and, second, that the United Kingdom purchases regularly and heavily during many months in which Western Canada has practically nothing to offer.

In October, 1913, Western Canada marketed 37,543,000 bushels, while the United Kingdom purchased of all kinds of wheat and flour only 19,075,000 bushels. In November, 1913, the Canadian marketings were 30,946,000 bushels, and the purchases of the United Kingdom, 16,918,000 bushels. In November, 1912, the figures were 27,563,000 bushels against 20,984,000 bushels; and in November, 1911, 19,941,000

[1] Appendix, Table 27, p. 112, Statistics, 1909-14.

bushels against 19,587,000 bushels. In these months there was delivered at Fort William and Port Arthur an absolutely greater amount than the United Kingdom would purchase of hard and soft wheat combined, and of flour, for delivery from all countries. If we add together the figures for the two months of October and November in each of these years under review, the comparison is as follows:—

	Canadian Marketings Terminal Elevators. Bushels.	Total Purchases United Kingdom. Bushels.
1909—October .... November..	32,137,000	38,497,000
1910—October .... November..	31,944,000	41,097,000
1911—October .... November..	30,261,000	39,515,000
1912—October .... November..	47,170,000	43,903,000
1913—October .... November..	68,492,000	35,993,000

If it could be determined exactly how much of the purchases of the United Kingdom consisted of hard wheat, it would undoubtedly be found that the Canadian supply exceeded the demand of that market in the above two-month periods in every one of these years, and that in 1913 it was considerably more than twice the quantity required. The May peak also, which should be constructed by placing the April storage column on the top of the May receipts, was greater in three of the years than the total demand for all kinds of wheat and flour in any one month, and very much greater than the demand for hard wheat alone. And Canada is by no means the only source of supply of hard wheat, even in the autumn months.

As over 61 per cent of the surplus product of Canadian mills during these years was shipped to the United Kingdom as flour and was included in the above quantities of total imports of that country, it is evident that even the very large purchases of wheat by the Canadian millers, second only in importance to the purchases of the United Kingdom, would only partially diminish the pressure of the Canadian peaks, as shown, upon the market of the United Kingdom.

Bearing in mind this relationship of Canadian supply to the demand of the United Kingdom, it will now be interesting to bring into juxtaposition the quantities marketed at Fort William and Port Arthur and the prices of wheat at Liverpool and at Winnipeg. For this purpose, diagram 13 is presented. In fig. 1 are the Canadian quantities which have already appeared in diagram 12, although in this case turned upside down as overhanging the market, the dotted line again representing world shipments to the United Kingdom. In the centre of the diagram (fig. 2) are two price-lines.[1] The black line represents the price of contract grade wheat on the Liverpool Corn Exchange, and shows the highest and lowest quotation on that exchange during each month. The red line represents the high and low quotations during each month on cash No. 1 Northern wheat on the Winnipeg Grain Exchange. At the bottom of the diagram (fig. 3) are the monthly shipments, by lake and by rail combined, from the terminal elevators at Fort William and Port Arthur, showing how the wheat moves out into general consumption.[2]

Taking first the two price-lines with their fluctuations, it is evident that both Winnipeg and Liverpool markets are subject to the same general conditions. In its general trend it is obvious that the Winnipeg market either follows the Liverpool market or moves with it under the same influences. A spread in price between the two exchanges is necessary if business is to be done between them, the spread being at least sufficient to cover all costs of the transfer of wheat from the elevators at Fort William and Port Arthur to dockside Liverpool. The spread is actually slightly greater than appears in

[1] Appendix, Table 28, pp. 113-114, Statistics, 1909-14.
[2] Appendix, Table 25, pp. 110-111, Statistics, 1909-15.

this diagram because No. 1 Northern Manitoba wheat, quoted at Winnipeg, is above the standard on which the Liverpool quotations are based, and commands a small premium, about 1¼ cents per bushel, when delivered on Liverpool contracts. Where the two price-lines overlap, or are very close together, after allowing for the premium as above, it is evident that no export business was being done by Canada or could be done. The spread between the prices becomes extreme toward the end of 1912 and toward the end of 1913.

Tracing the Liverpool price line alone, it will be noticed that there are three sharp upward movements, in 1909, 1912, and 1914, and one sharp decline in 1910. In the spring of 1909, Europe was in a nervous state following the annexation by Austria of Bosnia and Hertzegovina. This was the period also of the Patten "corner" in Chicago. In 1912 occurred the Balkan war, which not only had its effect on European sentiment, but the closing of the Dardanelles by Turkey interfered with exports from the Black Sea and shut up a considerable number of ocean vessels. The sharp upturn in 1914 marked the beginning of the present great war. The extreme drop in 1910 apparently had no great significance. At midsummer, as we have seen, Europe imports less wheat than at any other period of the year; the world's crop of 1909 had been the largest for many years, and the prospects for the European crop of 1910 were for a still larger local supply. Under these conditions, it is explained, some cargoes of grain from Australia arrived at Liverpool on shipper's account, and the owners were finally forced to sell at a big sacrifice, which temporarily became manifest in all market quotations. These four extreme fluctuations occurred, therefore, under exceptional conditions, and more ordinary causes must be looked to for the explanations of all other price variations shown.

The quantities in fig. 1 should now be closely examined in their relation to the price-lines in fig. 2, attention being first confined to the Liverpool prices. Starting at the right hand of the diagram and letting the eye follow down the direction of the autumn peak of 1913, it will be seen that it fits into a marked depression in the Liverpool price, the line having apparently sagged many cents per bushel. The same thing is seen with the autumn peak of 1912, although not to so great an extent. There are clearly defined depressions also corresponding to the autumn peaks in 1911, 1910, and 1909. In each one of these five years the heavy Canadian marketings at the end of the year have coincided with a depression in price. If we leave out of consideration the sharp "squeeze" in 1910, it will be seen that, with the exception of one year (1911), the price that has met the Canadian peak is the lowest of the year. In the first half of 1911, other countries, Russia and Australia, dumped unusually heavy loads on a market that was weak because there had been two large world's crops in successive years. Canada dumped her crop, as usual, a few months later, but, although it was the largest Canadian crop in volume up to that time, it was probably the poorest in quality, only about 41 per cent being of contract grade. Its real weight could not, therefore, be great in a market for contract grade wheat. It found a depression in price, but not in this one case the lowest of the year.

If the eye now follows the smaller peaks in the month of May, which peaks consist of the total in store in April plus the deliveries in May, the combined volume hitting the market, in a slanting direction as it were, in May and June, it will be observed that these peaks also, in every case except 1909, find a declining market. In no case has any large volume of the Canadian crop met a relatively high price. Other countries selling when Canada does are, of course, subject to the same price basis, but a study of the peaks marketed by all other large exporting countries within the above period shows that no other country has marketed so large a proportion of its crop when prices are low as has Canada.

Is this correspondence between the Canadian peaks and price depressions a mere coincidence, and chargeable to temporary bad luck, or is it in the nature of direct cause and effect? Has Canada, on account of financial, or transportation, or other

DIAGRAM Nº13

MONTHLY QUANTITIES OF WHEAT DELIVERED AT(FIG 1)AND SHIPPED FROM(FIG.3) FORT WILLIAM AND PORT ARTHUR IN RELATION TO PRICES AT LIVERPOOL FIG 2 BLACK LINE AND AT WINNIPEG FIG 2 RED LINE

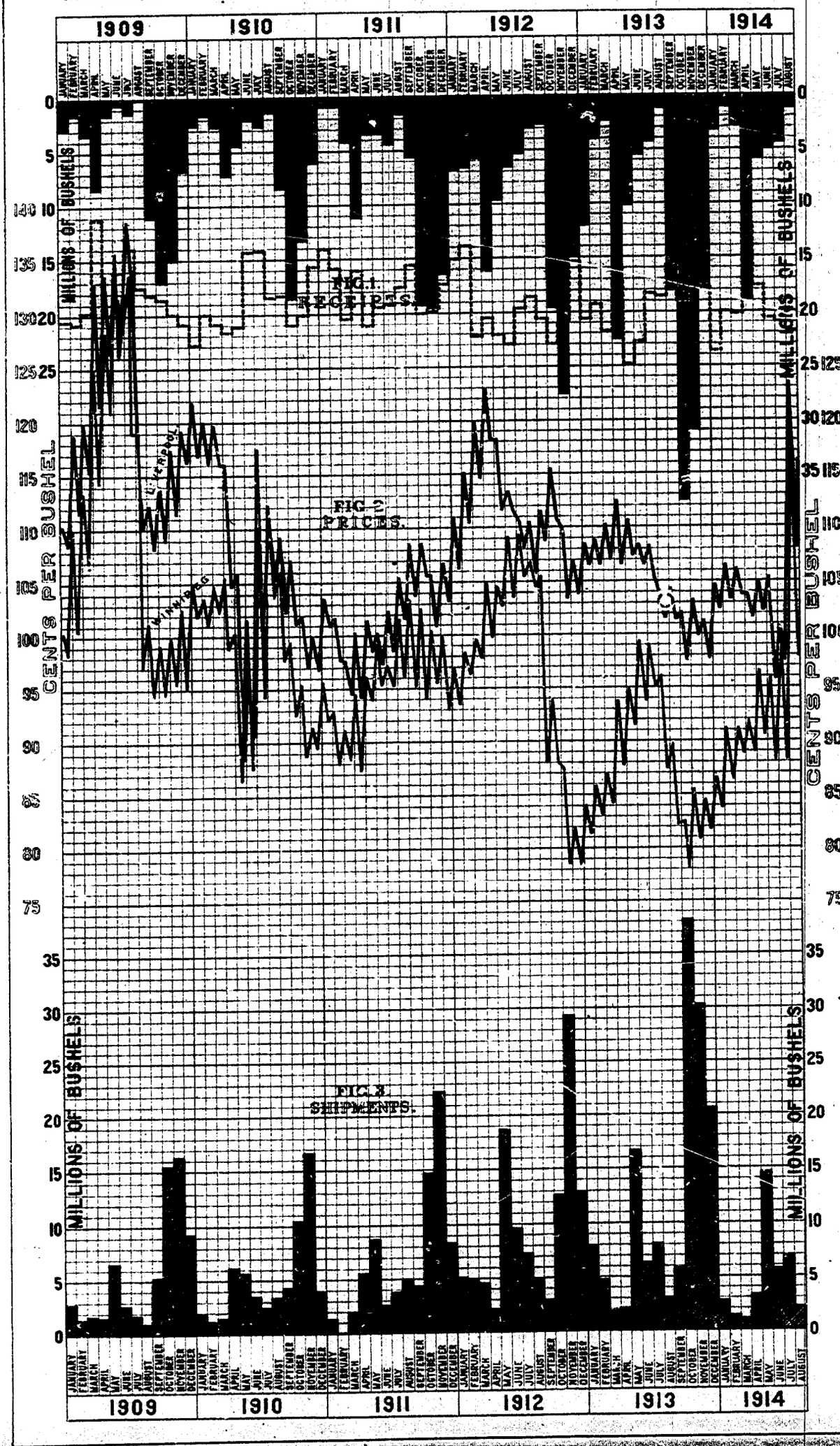
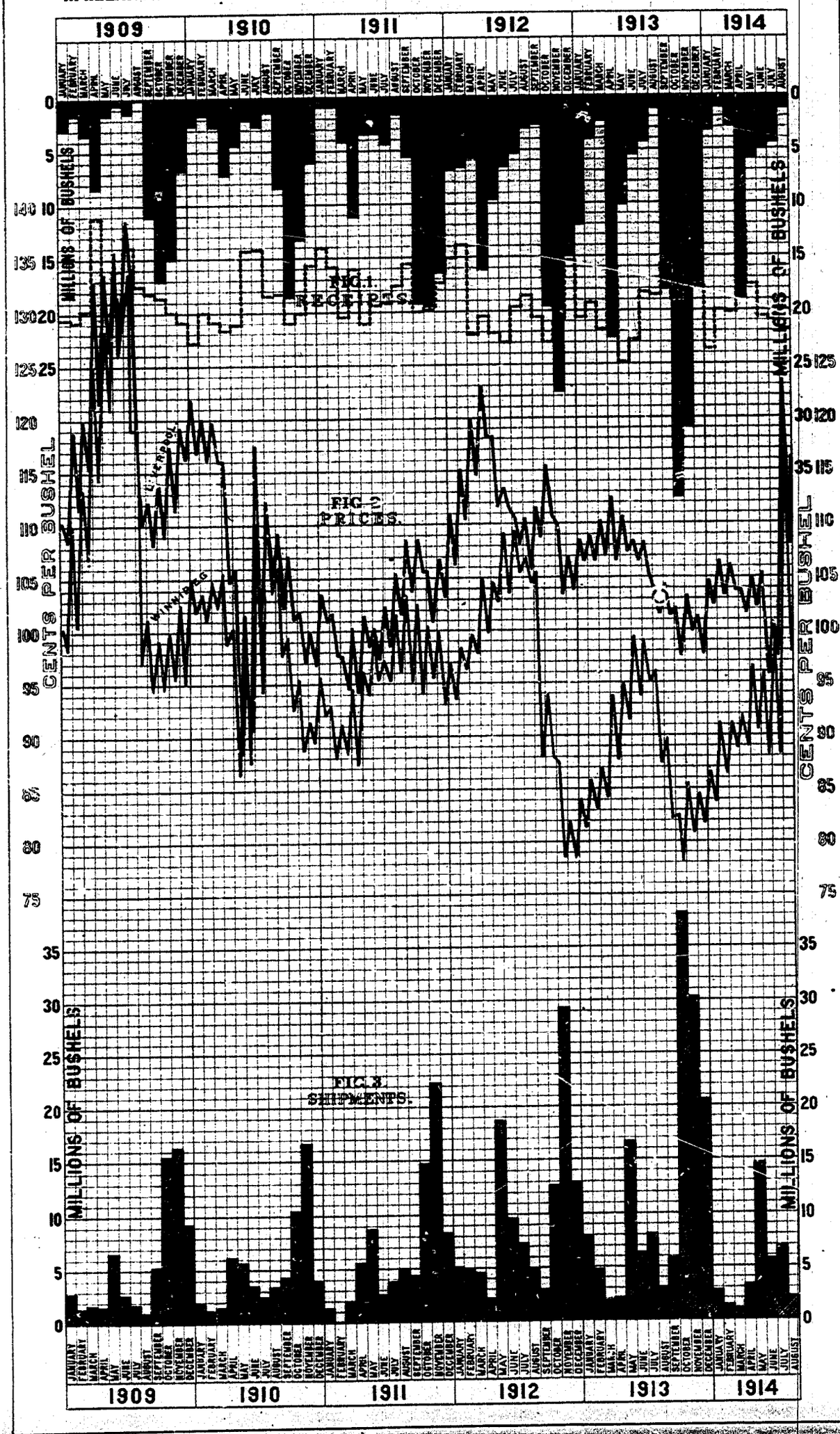


DIAGRAM Nº13

MONTHLY QUANTITIES OF WHEAT
DELIVERED AT(FIG 1)AND SHIPPED FROM(FIG.3)
FORT WILLIAM AND PORT ARTHUR
IN RELATION TO PRICES AT LIVERPOOL FIG 2 BLACK LINE AND AT WINNIPEG FIG 2 RED LINE



local conditions, merely happened to market a large part of its crop when the world's basis of price must necessarily be low? It would not, perhaps, be surprising if prices in the consuming markets of Europe were regularly lowest in September, October, November, and December, because the greater part of the world's wheat is raised in the Northern Hemisphere and is intrinsically cheapest in those months, and, moreover, Europe's position as a purchaser should at that time be strategically strongest, since she is then secure of many months' supplies, if need be, in her own newly harvested domestic crop. But the records do not show any tendency to extreme weakness in prices at that period of the year, at least in the last three months, previous to 1909. An examination of Liverpool prices from 1909 back to 1893 fails to discover a single year in which the low point was reached in October, in November, or in December. The minimum price is found three times in September when the winter wheat supplies of the Northern Hemisphere are most abundant; twice in January, twice in March, twice in April, once in June, and once in July. On the other hand, the high points during the eleven years previous to 1909 occur once in October, twice in December, once in January, twice in May, twice in June, twice in August, and once in September.

Western Canada, since 1909, has marketed an important quantity of contract grade wheat in October, November, and December, and this is the only part of the world which marketed a large exportable surplus of that grade of wheat in those months, a quantity which was much greater than the current requirements of the United Kingdom, and at times perhaps than the current requirements of all Europe for wheat of that quality, unless at bargain prices, and Western Canada has, since 1909, found a tendency to an extreme weakness in prices where weakness apparently did not previously tend to show itself. These facts justify serious consideration of the hypothesis of direct cause and effect. In the commercial world even a temporary oversupply tends to break prices.

Returning to diagram 13, the eye should now follow the Winnipeg price-line. It will be noted that the Winnipeg prices are never relatively high except when the quantities on the market are small. As soon as volume appears at the terminals, prices tend to go on an export basis, that is, a spread from the Liverpool price appears sufficient to permit of export to Europe. Just this would be expected to be the case. The only points calling for special explanation in the Winnipeg line are the extreme spreads in the autumns of 1912 and 1913. These are the periods of the greatest excess of Canadian marketings when compared with the current requirements of the United Kingdom. Any excess must inevitably begin to feel strongly the competition of inferior wheats, and, if it is to be sold, must tend to approach the price level of these wheats until it becomes a bargain; or, if it is not to be sold, it must decline to a point at which it can safely bear all carrying charges to some future month. In Western Canada this future month is generally May, and the market estimates the carrying charges at 4¼ cents to 5¼ cents. Further, a surplus always tends to set the conditions for the total supply, and an excess at Fort William and Port Arthur must tend to bring down the price of the whole quantity marketed at the same time to the basis on which the excess can be negotiated.

If the figure at the base of the diagram (fig. 3) be now studied in connection with the Winnipeg price-line, it will be seen how large a proportion of each year's crop moves out of the elevators at the lowest price of the year. Take, for example, the crop grown in 1913, which was shipped east in the twelve months beginning with September, 1913, and ending with August, 1914. During the first four months of this crop year, 71·55 per cent of the whole year's surplus was shipped east at the lowest prices of the year. As a considerable part of the subsequent May shipment peak was "hedged" during these months on the basis of current prices plus carrying charges, this quantity should really be added to the autumn peak to represent the full proportion of the crop which Western Canada let go on the depression which

coincided with, or was caused by, its excessive deliveries on the primary market in the last quarter of the year.

Conditions Affecting Cost.—Whether or not the system of marketing in one or two extreme peaks causes lower prices for wheat, it is certain that it tends in some respects to create higher costs. These higher costs may fall upon the producers of wheat, or they may appear to be widely distributed, but any avoidable costs are unnecessary limitations.

Diagram 14 represents in freight cars the monthly quantities of wheat delivered from the interior to the terminal elevators at Fort William and Port Arthur for the crop year 1913-14. The very large equipment of rolling stock required to move the October shipments, and the small demand during most of the rest of the year, are strikingly evident. In October, 1913, there was delivered at the terminals, 37,546,215 bushels of wheat, and therefore rolling stock sufficient for that purpose was in existence, and a corresponding number of locomotives, and there were all the double tracks and sidings and sorting yards necessary to handle traffic of that magnitude. These things, being in existence, represent a capital investment that calls for twelve months' interest every year. The last string of cars, marked "average," if steadily employed, could have carried all of the wheat in the same twelve months. So far as wheat is concerned, there was really required, under theoretically perfect transportation conditions, a capital investment in railway facilities equal only to the "average" train, which is less than one-third the size of the actual October train. If all grains were taken instead of wheat alone, each of the trains would be longer, but the proportions would not greatly differ. In Canada there is no big load of other traffic with an opposite seasonal distribution, and the "average" train could carry back from the head of the lakes to Winnipeg and the west the maximum load of the present westbound traffic. There is no intention of suggesting perfectly equal monthly shipments of grain as practicable, or even desirable, but there is no escaping the conclusion that present methods create an extra cost in fixed charges which must somehow be met.

The irregularity of the employment of labour in connection with grain traffic is another aspect of this same matter. Diagram 15 shows the maximum number of men employed by the Canadian Pacific Railway Company each month of the above crop year on grain traffic on the Alberta, Saskatchewan, and Manitoba divisions, the last named embracing the lines to Fort William. The men counted were the engineers, firemen, brakemen, and conductors engaged on grain trains, and the yardmen employed because of grain traffic. Exactly the same conditions prevail on the other railways. In the operating departments of the railways there is no compensating demand for labour in the slack grain months. Employment of labour in this manner, apart from its serious sociological bearing, must tend to add to costs.

One further point may be emphasized, in diagram 16, and that is the nature of the demand under the present system for lake vessels to carry the wheat from Fort William and Port Arthur. This part of the subject has already been dealt with from a somewhat different point of view in discussing traffic conditions in the Lake Superior trade. Shippers of wheat in October, 1913, chartered almost three times the number of vessels that would have been required to move the whole year's load if it had been evenly distributed over the same navigation months. In the inserted figure in this diagram the inevitable consequence of such methods appears in freight rates. From September the rates moved upward to a high point in December, the two weeks of open navigation in which month generally witness the most active demand of the season, and fell again toward the low point as traffic declined. The greater part of the shipments bore the higher rates.

Tendencies toward excessive costs must be provided against as carefully as tendencies toward inequitable depressions in price, if the production of, and therefore the traffic in, wheat is to measure up to estimates based on the fertility of the soil and the capacity of the world's consuming markets.

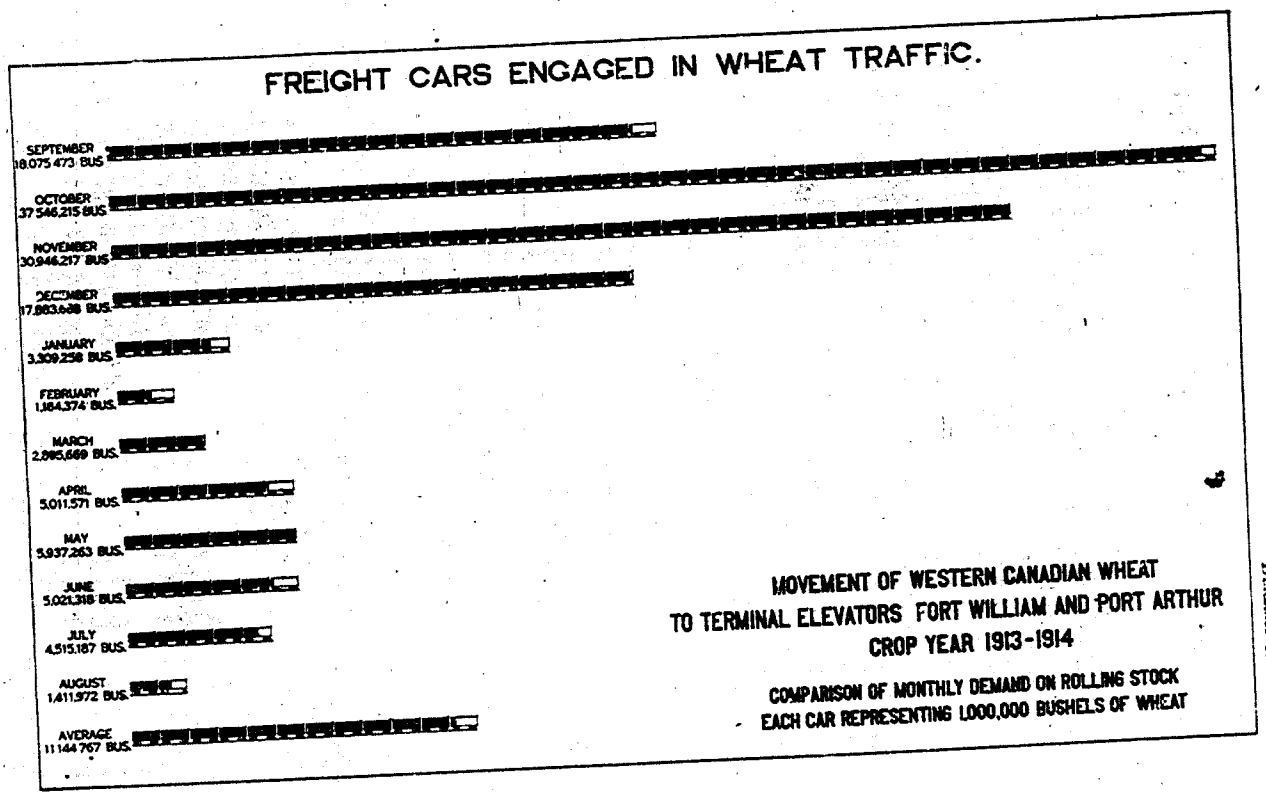
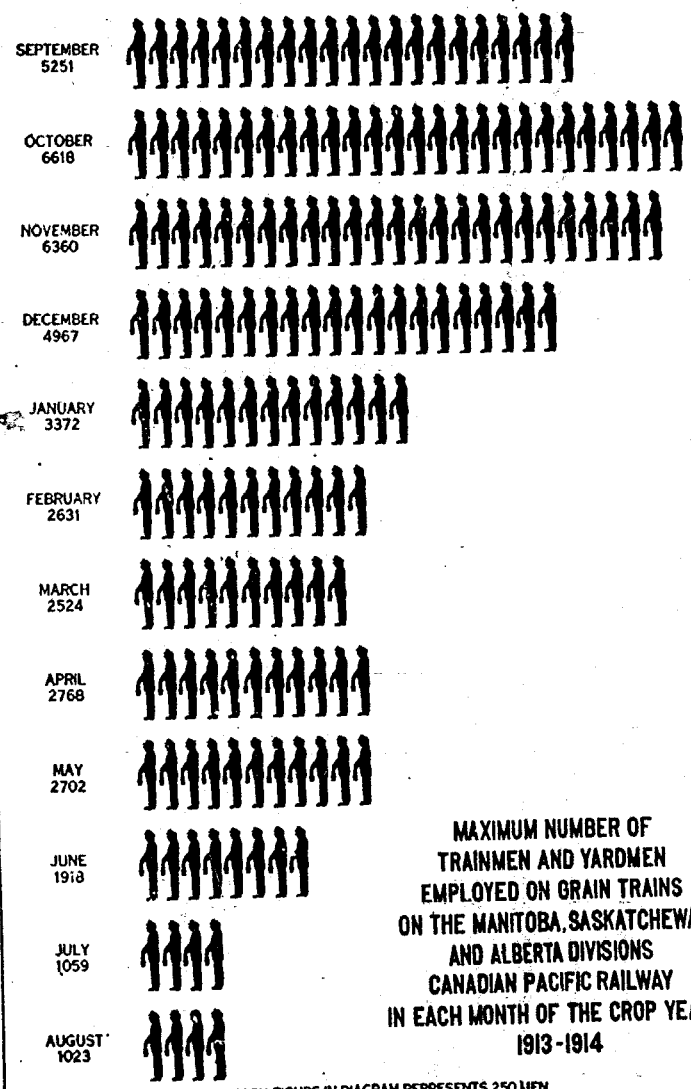


DIAGRAM No. 14.

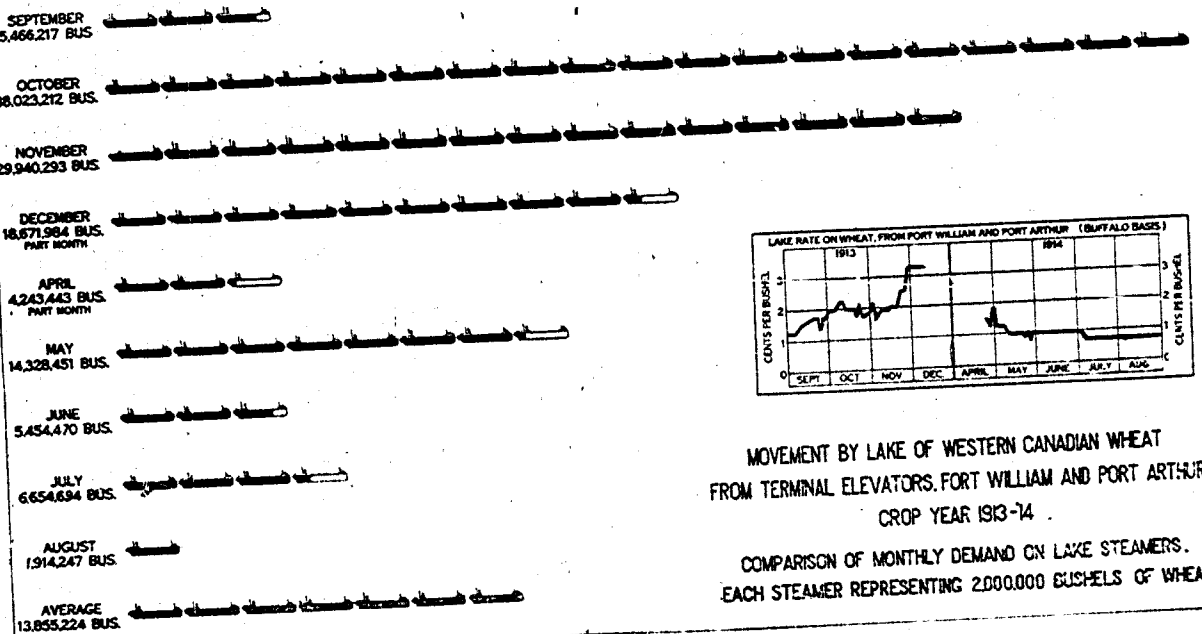
LABOUR EMPLOYED IN GRAIN TRAFFIC



MAXIMUM NUMBER OF TRAINMEN AND YARDMEN EMPLOYED ON GRAIN TRAINS ON THE MANITOBA, SASKATCHEWAN AND ALBERTA DIVISIONS CANADIAN PACIFIC RAILWAY IN EACH MONTH OF THE CROP YEAR 1913-1914

NOTE.-EACH FIGURE IN DIAGRAM REPRESENTS 250 MEN

LAKE VESSELS ENGAGED IN WHEAT TRAFFIC.



MOVEMENT BY LAKE OF WESTERN CANADIAN WHEAT
FROM TERMINAL ELEVATORS. FORT WILLIAM AND PORT ARTHUR.
CROP YEAR 1913-14 .

COMPARISON OF MONTHLY DEMAND ON LAKE STEAMERS.
EACH STEAMER REPRESENTING 2,000,000 BUSHELS OF WHEAT

DIAGRAM No. 16.

THE ROUTING OF EXPORT WHEAT.

From Fort William and Port Arthur wheat for export to Europe is distributed over many routes to the seaboard, and is shipped from some seven or eight different ocean ports. A part of the wheat follows Canadian routes to Canadian ocean ports, and part is diverted at some stage of its journey eastward to United States routes and to United States ocean ports. It is clearly necessary to examine the distribution of export shipments under normal conditions in order, if possible, to discover the determining causes. Unless the real causes, under present conditions, of the diversion of so much Canadian wheat to United States ports are recognized, it cannot be confidently asserted that any particular change in conditions will materially alter the situation.

What, in the first place, are the facts concerning the present diversion and distribution of export wheat shipments? In diagram 17 are presented the facts for the calendar year 1913. In this diagram the movement of Canadian wheat from the head of the Great Lakes to the seaboard is traced in solid black lines, drawn to a scale of width in accordance with the number of bushels passing over each part of the route. In the tables of figures inserted in the diagram will be found the principal quantities. Some Western Canadian wheat is forwarded each year by rail to Duluth-Superior for shipment from that point. Passing down the lakes this comparatively narrow stream joins the broad stream from Fort William and Port Arthur, and the combined total flows eastward through the St. Marys river. A tiny rivulet then diverges to Chicago and a little later a substantial stream moves toward Georgian bay and is divided up among many ports. The main stream, however, continues south through lake Huron, losing a little to Goderich, a little to Port Huron, and a trifling amount to Detroit. In its passage through lake Erie a very small quantity branches off to Toledo and another to Port Stanley, and quantities of some importance to Fairport and Erie. The chief body of the remaining stream flows straight to Buffalo, the balance swerving northward to be divided between the Port Colborne elevators, from which it is later transhipped, and the all water route to Kingston, Prescott, and Montreal. In the diagram all receipts at Canadian lake ports as well as those at Port Huron are carried through at full width to Montreal, and the export wheat which could be traced as having been shipped all rail in that year is also indicated as arriving at Montreal. It will be observed that the receipts thus shown for Montreal are greater than the wheat exports that passed on through that point. The difference would represent the amount of Western Canadian wheat which was retained in Ontario and in Quebec for milling purposes, or remained in various public elevators. Of the United States ports of export, Portland is represented as being supplied through Montreal, and Boston, New York, Philadelphia, and Baltimore through Buffalo, Erie, Fairport, and Toledo. Boston at times receives Canadian grain by way of Montreal. The width of the line of receipts at Buffalo is a little greater than the line of shipments passing on through Buffalo, for the reason that some Canadian wheat remained in winter storage in vessels lying in Buffalo harbour, and did not pass on within the calendar year.

To arrive at the total proportion which went out through United States ocean ports, the shipments to Portland must be added to the quantities which were diverted from the head of the lakes to United States routes, and which are brought together into one stream east of Buffalo in order that their comparative magnitude may be seen. In round figures two-thirds of the Canadian export wheat in the calendar year 1913 was

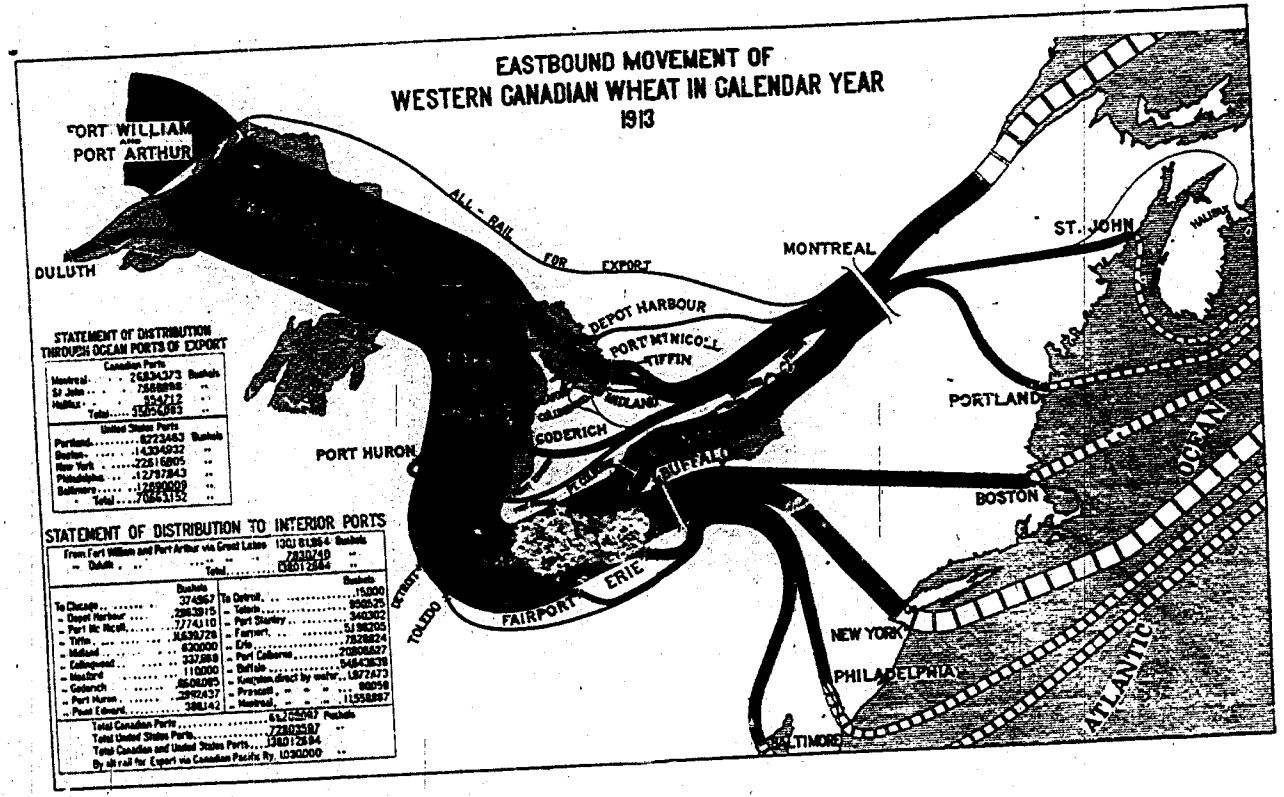


DIAGRAM No. 17.

shipped through United States ocean ports, and one-third through the Canadian ocean ports. Quantities and proportions differ in different years, but a considerable diversion to United States routes appears to be the normal condition, although the normal proportion so diverted could be determined only after further examination of the facts.

Yearly total figures, such as represented in the above diagram, do not often supply sufficient material for a study of causes. To secure the necessary material there were taken, from the original records at Fort William, Port Arthur, and Duluth, particulars of every shipment of Canadian grain, and from the files of ships' manifests at Montreal, St. John, and Halifax the name of every vessel loading Canadian grain, distinguished as liner or tramp, with the date of loading, the quantity of each kind of grain carried and the port to which it cleared; and through the courtesy of the Department of Commerce, Bureau of Foreign and Domestic Commerce, at Washington, a competent statistician compiled, from the original records there, monthly details of the movement of Canadian products, in bond, through the United States ocean ports. This material covers the three calendar years 1911, 1912, and 1913.

Causes of Diversion.—Diversion may have been due to one or more of many causes: the physical inability of Canadian routes to handle more traffic; the superior speed or certainty of other routes; relative freight rates; financial, or other private business considerations, or personal preferences on the part of the shippers; conditions of ocean transportation. It will, therefore, be important to examine in more detail the movement of Canadian export wheat.

Diagram 13, which contains three figures, represents the manner in which Canadian export wheat leaves Canada month by month, by being shipped from Canadian ocean ports and being diverted to United States routes. The quantities shown as diverted to the United States do not always pass through United States ocean ports in the same months in which they are diverted from Canada; and this diagram, therefore, is not a direct comparison, by months, of ocean shipments, but only of shipments from Canada.

Fig. 1 shows the total shipments from Canada, the solid black portions of the monthly columns being the shipments from Canadian ocean ports, which are called "direct exports," and the balance of the columns the quantities diverted to United States routes, called "indirect exports." In figs. 2 and 3 these direct and indirect exports are shown separately.[1]

If fig. 2 is examined, it will be noted that it possesses some general regularity of form. In the months of December, January, February, March, and April the port of Montreal is closed, and the exports during these months are through the ports of St. John and Halifax, and are substantially equal in amount. In the month of May export from Montreal begins and continues until the end of November. During these months the exports are much greater in quantity; and if an imaginary line be drawn from the tops of the May columns to those of the November columns the idea is suggested that the almost rectangular figures thus formed represent in some way the capacity, or the usefulness, of the Montreal route, under the conditions that prevailed in each of the three years under review. Montreal does not export the same amount each month, the most marked departure from substantial evenness being found in the months of September and October in the years 1912 and 1913. That less wheat was shipped in these months was not due to there being no Canadian wheat for export, as appears from fig. 1. A study of Canada's total exports of all goods month by month discloses the tendency to crowd all exports upon the last third of the year. In September, October, and November the vessels arriving at Montreal are offered more cheese, apples and higher class goods than in the earlier months of the season, and the irregularity in the shipments of wheat may be due to the irregular offerings of

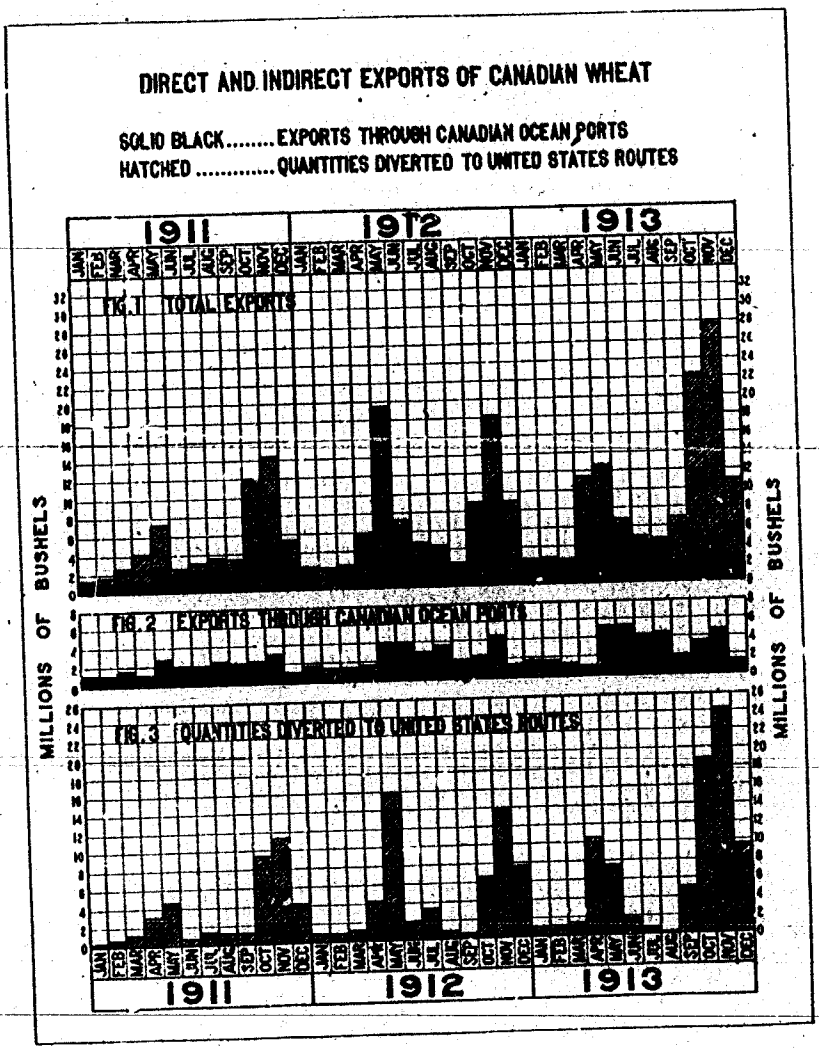
[1] Appendix, Table 29, p. 115, Statistics, 1909-13.

other freight, which carried somewhat higher rates and would be given the preference accordingly. The increased shipments in the month of November, when large quantities of other freight are still offering, may, perhaps, be explained by the higher freight rates obtainable for wheat in that month, which may have made it profitable for vessels to go to the expense of increasing their freight accommodation, which could be done in combination liners, for example, by fitting steerage quarters for package freight, thus leaving more space in the holds for wheat. It is not intended at this stage to assume any definite explanations, but only to point out the approach to regularity of form in the direct exports of Canadian wheat, in order that the entirely different character of the indirect shipments (fig. 3) may be observed.

The only regularity about the traffic diversion to United States routes is the fact that these routes carry the two peaks Western Canada thrusts forward. The first suggestion from this diagram, as a whole, is that the Canadian ports do a certain more or less regular business, and the United States routes carry the peaks of the loads. It is clear that the United States routes are not always competitors of the Canadian routes with the same effectiveness. From the relative quantities in the month of November, 1913, as shown in fig. 1, it cannot, for example, be inferred that the United States routes can always successfully compete with anything like the proportionate results there shown, for in the month of August, 1913, Montreal took nearly all the wheat offered, and in many other months it secured by far the larger quantities. Montreal exported more Canadian wheat than any other single port, New York coming second, Boston third, Philadelphia fourth, Baltimore fifth, Portland sixth, and St. John seventh.

The closing of navigation on the St. Lawrence in the winter months is a physical limitation on the Canadian routes, which may well have some effect on total yearly quantities shipped. During the period of open navigation, however, there is no climatic cause of diversion and shipments through Montreal may, therefore, be more particularly studied. That Montreal's proportion of the total export shipments of Canadian wheat in 1911, 1912, and 1913 was not larger cannot be satisfactorily accounted for, either by the physical shortcomings of the routes to Montreal from the interior, or by the inadequacy of the equipment on them. The St. Lawrence and Welland canals have never carried more than a moderate fraction of the traffic that could be passed through them; and, as we have seen, many Canadian vessels of "canal size" spend most of the season in the open lake trade, so that no continued shortage of vessels suitable for the all-water route could have been experienced. With regard to the lake-and-rail routes to Montreal, the capacity of the water section, could, of course, be limited only by the number of vessels available. Canadian vessels in those years carried all the Canadian coasting traffic in wheat, supplying Canadian millers as well as export requirements; they were not, on the average, fully loaded eastbound, as has been shown; and they were left free to carry some cargoes to United States ports, that is, to participate in the diversion. In October, 1913, there was loaded into Canadian vessels at Fort William and Port Arthur 14,020,901 bushels of wheat, and in the following month 18,126,533 bushels of wheat; the greatest month's export of wheat through Canadian ports was in the month of May, 1913, when the quantity was only 5,243,408 bushels; so that Canadian vessels on the lakes have loaded in each of two consecutive months over 2½ times the quantity of Canadian wheat that Canadian ocean ports have ever shipped in a month. Even if Canadian lake tonnage had been deficient, more Canadian wheat might have been shipped in United States vessels to such a point as Port Huron, from which Canadian rail lines could have carried it to Montreal; or to Buffalo, from which Canadian, or United States, vessels could have carried it by water to Montreal; and again more Canadian wheat might have been directed from the interior to Duluth-Superior where it could have taken United States vessels to Canadian ports. No ques-

DIAGRAM No. 18.



tion can be raised about the ability of the rail lines across southern Ontario to handle in a season more ex-lake traffic than they have ever yet received.

Nor is any easy explanation found in freight rates. It would appear that the Canadian wheat that was diverted to United States ocean ports paid higher rates to the seaboard than did the wheat shipped to Montreal. An examination of regular and special tariffs for several years has failed to discover any period in which United States routes to the seaboard for Canadian wheat were allowed to have an advantage in freight rates over Canadian routes.

Montreal in 1914, with no corresponding increase in handling plant, exported 82 per cent more wheat than in 1913, or 38 per cent more of all grains, the greater part being United States products. Montreal's mechanical equipment could have handled more wheat than it did in 1911, 1912, and 1913, if more wheat had been offered.

Whatever may be the need of increased handling facilities at Montreal, of an enlarged fleet on the lakes and of better service on the railways, it would appear that present deficiencies in these respects do not completely explain why it was, for example, that only one-third of Canadian export wheat in 1913 passed through Canadian ocean ports.

Before attempting to estimate the diverting power of other possible causes, it may be well to inquire first into the conditions of transportation on the ocean. The exporter of wheat wishes to ship wheat to Europe. If he cannot ship right through to Europe in time to fulfil a contract offered him and at a total cost for the whole journey that will leave him a satisfactory net price, he will not ship at all. He may have preferences as to routes and ports, but he must at any given time choose the through route and the combined through rate that will enable him to do business. If the explanation of his routing of Canadian export wheat does not readily appear in local conditions between Fort William and Port Arthur and the seaboard, the final stage of the through route must be examined.

As in the case of traffic on the lakes, there should be some understanding of the types of vessels, of their distribution, of load factors, of freight rates, and perhaps of various incidental costs and charges.

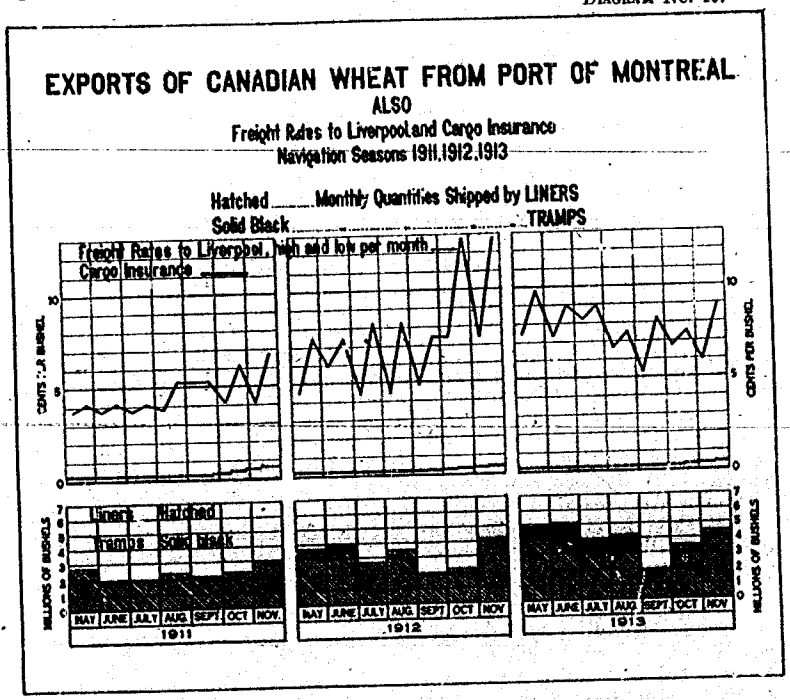
Liners and tramps.—In 1912, the overseas commerce of the world was conducted by more than 25,000 steamers, of which 1,555 were "liners" and 23,500 "tramps." Vessels engaged in regular-line service, that is, vessels upon a fixed route and with a definite schedule of sailing dates, are known as "liners." The "tramps" are free to sail anywhere in search of a profitable cargo, and to be chartered by the highest bidders in the great shipping exchanges of the world. The 25,000 ocean carriers in 1912 were owned by approximately 4,200 different companies, firms, and individuals, and the 1,555 liners by 108 different companies.[1]

The functions performed by these two general classes of ocean carriers differ in many important respects. Tramps cannot perform as satisfactorily as liners many of the services required in modern commerce, but with respect to such traffic [illegible] the two classes are directly competitive.

[1] Investigation of Shipping Combinations, evidence before the Committee of the Merchant Marine and Fisheries, House of Representatives, 62nd Congress, Hearings, Volume 2, p. 1372.

In diagram 19 the relative quantities of Canadian wheat carried by liners and by tramps from Montreal in the years 1911, 1912, and 1913 are indicated. The figures are as follows:—

DIAGRAM No. 19.



CANADIAN Wheat Shipped from Montreal by Liners and by Tramps.

Compiled direct from Ships' Manifests.

Month.	1911.		1912.		1913.	
	Liners.	Tramps.	Liners.	Tramps.	Liners.	Tramps.
	Bush.	Bush.	Bush.	Bush.	Bush.	Bush.
May	2,709,058	.....	3,553,283	27,056	4,348,493	528,337
June	1,928,485	.....	3,619,841	380,296	3,633,585	1,429,635
July	1,879,246	.....	2,775,194	.....	3,199,444	704,672
August	3,365,366	.....	3,553,768	.....	3,279,110	939,727
September	2,167,813	.....	1,983,463	.....	1,775,171	132,284
October	2,341,751	.....	2,284,683	.....	3,357,506	69,818
November	3,102,492	.....	4,534,723	.....	4,446,642	.....
Total	16,294,141	.....	22,304,955	407,352	24,039,950	3,794,423

It will be noted that tramps carried no Canadian wheat from Montreal in the year 1911; that they carried a little in May and June, 1912; and that in 1913 they carried an appreciable quantity in several months of the season. Of the total wheat exports for the three years, tramps carried 5·66 per cent. In 1913 the percentage was 13·63, and in the month of June in that year they carried 28·23 per cent of the monthly total. It is evident that tramps proved in those years only a small and irregular factor in the wheat trade.

In the same diagram there is indicated the range, from lowest to highest, of ocean freight rates on wheat, month by month, from Montreal to Liverpool,[1] which may be taken as representative of freight rates to Europe. In 1911, freight rates were the lowest of the period. In that year there were no tramps. In May and June, 1912, the range had moved higher, and there were one or two tramps. In 1913 there was a distinct and sustained elevation of rates for the greater part of the season, and there were many tramps. In October and November, 1912, on the other hand, some rates were very high and yet no tramp cargoes are reported. All that can be said, therefore, from this examination of shipments in relation to freight rates, is that in 1911, 1912, and 1913 no tramp vessel took from Montreal a cargo of Canadian wheat except when freight rates were comparatively high, but that tramps were not attracted on every occasion on which the rates were high.

Merely incidentally, there are also introduced in diagram 19, lines indicating cargo insurance out of Montreal,[2] drawn to the same scale as the freight rates. Wheat is assumed to have been worth $1 per bushel at the seaboard, and a rate of 25 cents per $100, for example, to have been equivalent to a charge of one-quarter cent per bushel. Whatever may be the effect of relative insurance rates on the diversion of wheat traffic, it is perfectly clear that cargo insurance cannot be the immediate cause of this diversion. There are big forces of some kind swinging freight rates up and down, in comparison with which cargo insurance is a very small factor.

The next question that may naturally arise is as to the part played by tramp vessels in the grain traffic of those North Atlantic ports of the United States which attract so much Canadian wheat. The following are the figures for the four years, 1910-13, of the tramp cargoes of grain of all kinds loaded at Boston, New York, Philadelphia, and Baltimore:—

Year.	Boston.	New York.	Philadelphia.	Baltimore.
1910		4	1	11
1911		24	14	17
1912		20	36	58
1913			34	129

It is obvious that it was not the large numbers of tramp vessels in the grain trade out of Boston and New York that can explain the diversion of Canadian wheat to those ports. In 1903, Boston loaded two tramp cargoes of grain, but apparently no more from that time to the end of 1913. In 1903, New York recorded eleven tramp grain cargoes, but from 1903 to 1911 not a single tramp cargo is recorded. According to records since 1876, Baltimore has loaded tramps every year, and Philadelphia every year but one, 1904; but on the average more tramps were loaded at Baltimore than at Philadelphia. In the appendix[3] will be found figures covering this whole period, which indicates that, since 1900 and up to the beginning of the war, tramp vessels were but

[1] Appendix, Table 30, p. 116, Statistics, 1909-14.
[2] Appendix, Table 31, p. 116, Statistics, 1911-14.
[3] Appendix, Table 36, p. 127, Statistics, 1878-1915.

a small factor in the North Atlantic grain trade. The liners evidently dominate the wheat exports.

Ocean Freight Rates on Wheat.—It will be desirable at this point to take a somewhat wider survey of the problem and inquire whether the changes in ocean freight rates just noted in the Montreal-Liverpool route, and which would seem to have been under the influence of powerful forces, are local in character, or peculiar to the Canadian port or even to the North Atlantic trade. Material for this survey has been obtained through the courtesy of Broomhall's Corn Trade News, at Liverpool, and Comtelburo's Daily Freight Register, at London. Mr. Broomhall was asked particularly for rates to Liverpool, which is the leading port of the United Kingdom for liners, the quotations to cover liner, or "berth," rates as well as tramp rates, and from his records furnished current rates, not necessarily confined to Liverpool rates, quoted on the first business day of each week, from January, 1909, until December, 1914, from the following ports: from New York, in the United States; from Odessa, the principal Black Sea port of Russia; from Karachi, the leading grain port of India; from the River Plate, down River, in the Argentine; and from Australia. The Baltic Exchange in London is the greatest charter market in the world for tramp vessels, and quotations from the Daily Freight Register are exclusively tramp rates and are in the form of high and low rates per month to the United Kingdom from the same ports, but including also tramp rates from Canadian Atlantic ports. The tramp rates from New York, Philadelphia, and Baltimore are generally the same, or rather tramps are generally chartered to load "Atlantic Range," that is, with the option to the shipper to select any one of several ports on the North Atlantic coast of the United States which have come by the custom of the trade to be placed upon the same basis, and this has some interesting consequences. Tramp rates from the Daily Freight Register are therefore "Atlantic Range" rates rather than New York rates.

These two sets of quotations have been charted in diagram 20.[1] Ocean freight rates are, of course, almost always quoted in shillings and pence and the unit of weight is sometimes the quarter (eight bushels), and sometimes the ton, and there are several different kinds of tons, according to the usage of each trade. For the purpose of this diagram the quotations received as above have been reduced to the common basis of cents per bushel of 60 pounds.

To fig. 1 have been added the freight rates from Montreal to Liverpool, which were used in diagram 19. These Montreal rates are represented in their range from high to low per month and therefore are in a different form from the other rate lines, which are based on a single quotation per week, but if the general trend of the Montreal rates be followed, comparisons can be made without difficulty.

Points to be noted in this diagram are:—

1. The remarkable parallelism of the main rate lines. By looking at the figures as a whole this fact can be clearly seen, and the point should be carefully noted. If the Argentine rate line be temporarily disregarded and attention fixed on the rate lines of Australia, Karachi, Odessa, and New York, the tendency is clearly apparent for these lines to maintain approximately the same proportionate distance from each other throughout the whole period. Marked temporary fluctuations occur in the individual lines, which may not instantly show themselves in the other lines, but there are few cases in which an important upward or downward movement in any one line does not stand in relation to a somewhat corresponding movement in the other lines within a period of two or three months.

2. That the spaces separating these main rate lines seem to bear some relation to the differences in distance from the United Kingdom. Odessa is 400 or 500 miles

[1] Appendix, Tables 32-33, pp. 117 to 124, Statistics, 1909-14.

more distant than New York; Karachi is almost twice as far from the United Kingdom as is New York; and the shortest route from any important Australian port is about three and a third times as long as the route from New York, though some routes from Australia by way of the Cape are about four and a third times the length of the route from New York.

3. That the New York and Montreal rates are, on the whole, the lowest rates to the United Kingdom enjoyed by any of the ports, and, except at one or two period- the range of the rates from Montreal does not differ widely from the range of rates from New York. No exact comparison can be made between the Montreal line and the New York line because the former moves sharply between the highest and the lowest rates in each month while the latter flows between specific rates taken once a week. A study in detail of the relation between Montreal and New York rates would require more material than is supplied in this diagram.

4. That on two or three occasions Montreal rates appear relatively high or relatively low, but that Montreal rates are, on the whole, clearly subject to the same general forces as operate on other rates. It was in the first half of the navigation season of 1913 that Montreal rates were highest, relatively, being then higher than Odessa rates and as high as some Argentine rates. It was in this period Montreal had the greatest number of tramps shown in diagram 19. Montreal rates were not relatively high in October and November, 1912, although actually higher than in 1913, and there were no tramps. In the beginning of the season of 1912, when the range was much lower, Montreal rates were relatively high when compared with New York and Odessa and there were one or two tramps. It is possible, therefore, to amplify the inference from diagram 19 by stating that in the period examined tramps entered the Montreal wheat trade only when rates were relatively high.

5. That the tramp rates in fig. 2 tend to be higher than the rates in fig. 1. This is the case with every individual rate line. Some allowance must be made for the difference in the way the rates are quoted for these two figures, but as it is not understood that Liverpool regularly enjoys, under equal conditions, more favourable rates than other leading ports of the United Kingdom, it is probable that the liner rates included in figure 1 give to that figure a lower range than is found in the exclusively tramp rates in fig. 2. In other words, it is probable that tramps enter every wheat trade, as well as the Montreal trade, when rates are comparatively high. Among the details that may be noted under this heading is that New York and Montreal do not seem to have the lowest rates in fig. 2 as regularly as in fig. 1, the advantage often resting with Odessa. New York and Montreal seem to have paid relatively more for their tramps than for their liners. The merely occasional character of tramp business with Montreal is shown by the scattered quotations. The New York, or more correctly the "Atlantic Range" tramp rate line is also very much broken. It is suggested by fig. 2, therefore, that the tramp is a much more permanent factor in all the other trades than it is in the North Atlantic trade.

The Argentine rates cover a wider range in the period than any other rates. At the beginning of January, 1909, they held almost exactly their proper position in relation to distances, but for the following years they remained relatively low, while in 1912 and during parts of 1913 and 1914 they appear to have been unduly high. The somewhat erratic character of the Argentine rate line need not necessarily disturb such inferences as seem indicated by the general relationship between the other rate lines. One great trunk line of ocean travel from the United Kingdom and Northern Europe sweeps across the North Atlantic to the United States and Canada, while the other great trunk line sweeps through the Mediterranean, with branches to the innumerable ports there and on the Black Sea, and on through the Suez canal to the Indian ocean where it divides, one branch going to India and the Far East and the other to Australia. On account of the magnitude of the trade tributary to these two great trunk lines and to the variety of traffic and the number of ports, particularly on the

Mediterranean and Far Eastern trunk line, it might be natural to expect that traffic conditions, and therefore freight rates, would tend to be somewhat more stable than in the case of the minor traffic route through the South Atlantic ocean. Moreover, Suez Canal tolls, which during this period averaged about $1.25 per registered ton (Suez measurement), would prevent extreme reductions in rates from India and Australia, for this fixed charge, being on vessel capacity, would become relatively heavier as rates declined or vessels were less fully loaded. When traffic increased and vessels became relatively scarce, as they did in 1912, and when these world conditions coincided with some relative decrease in imports by the Argentine, it might be expected that rates in the South Atlantic trade would sharply rise. On the average for the whole period, however, the Argentine rates preserved about their relative place on the scale.

Competition on the ocean.—If it be assumed that the law of supply and demand has almost free, and even uncompromising, play upon the ocean, then it would be expected that there would be wide and sometimes rapid changes in rates; low rates in dull times such as preceded 1912; high rates when the pressure of traffic increases, and the supply of vessels becomes relatively or absolutely reduced, both of which conditions occurred in 1912. If, now, it be further assumed that there is effective competition among the 23,500 tramps, and, in certain classes of goods and under certain conditions, between the tramps and the 1,555 liners, and also more or less active competition among the liners themselves, then it would be expected that any tendency in rates would be quickly communicated to every ocean trade, and, whether rates were high or low, that in every trade, as soon as the machinery of competition could operate, rates would tend to be adjusted to a common basis of earning value to the vessels, that is, so adjusted that vessels in one trade could not earn much more than vessels in any of the other trades. This would mean an adjustment bearing some relation to distance, but modified by time, load factor, and incidental costs.

Whatever may be the correct conclusions upon the general theory of ocean rates, the facts regarding wheat rates for six years are as set forth in diagram 20. It has never been found practicable to effectively organize the 4,100 owners of tramp vessels for the fixing of rates. Competitive bidding is provided for in tramp markets at leading centers throughout the world and these centers are in constant cable communication with each other. Wheat is an entirely suitable cargo for tramps. It is also highly desired by liners to supplement other freight. Liners on the North Atlantic, before the days of freight conferences, occasionally carried parcels of wheat for nothing, and even purchased wheat when ballast was needed. Under conference conditions a minimum rate of 3 cents per bushel has been agreed upon, but even then a liner is free to carry up to 96,000 bushels at a lower rate on any trip when more ballast is required.

A combination liner, that is a vessel fitted to carry both passengers and freight, is probably, when on a good trade route, the most successful type of ocean carrier. Having some passengers, and some high-class freight, the combination liner, when it wants wheat, can afford to carry it at a rate the tramp cannot meet. A large proportion of the comparatively few combination liners in the world are in the North Atlantic trade, which is pre-eminently the liner trade. These liners take what wheat they want before the tramps can get a chance at it. To do this they must, as a general rule, keep their rates on wheat within the minimum fixed by the worldwide tramp competition, and within that limit they may be expected to demand on every shipment as high a rate as possible. Competition among the liners themselves must also be a factor of some importance.

Effects on Canadian Wheat Exports.—Returning, now, to the distribution of Canadian wheat exports as between Canadian and United States ocean ports, it may be

DIAGRAM Nº 20

OCEAN FREIGHT RATES ON WHEAT TO UNITED KINGDOM FROM CHIEF EXPORTING COUNTRIES.

CANADA, MONTREAL..... 2,800 Miles ——— RUSSIA, ODESSA. Black Sea.....3,500 Miles ——— INDIA, KARACHI..... 6,100 Miles ———

UNITED STATES, NEW YORK..3,100 " —— ARGENTINE, RIVER PLATE. Down River... 6,200 " —— AUSTRALIA, via Cape Good Hope. 10/13,000 " ——

NOTE- DISTANCES ARE ONLY APPROXIMATE

FIG. 1 AS REPORTED AT LIVERPOOL Broomhall's "Corn Trade News". One rate weekly, Montreal High and Low per month.

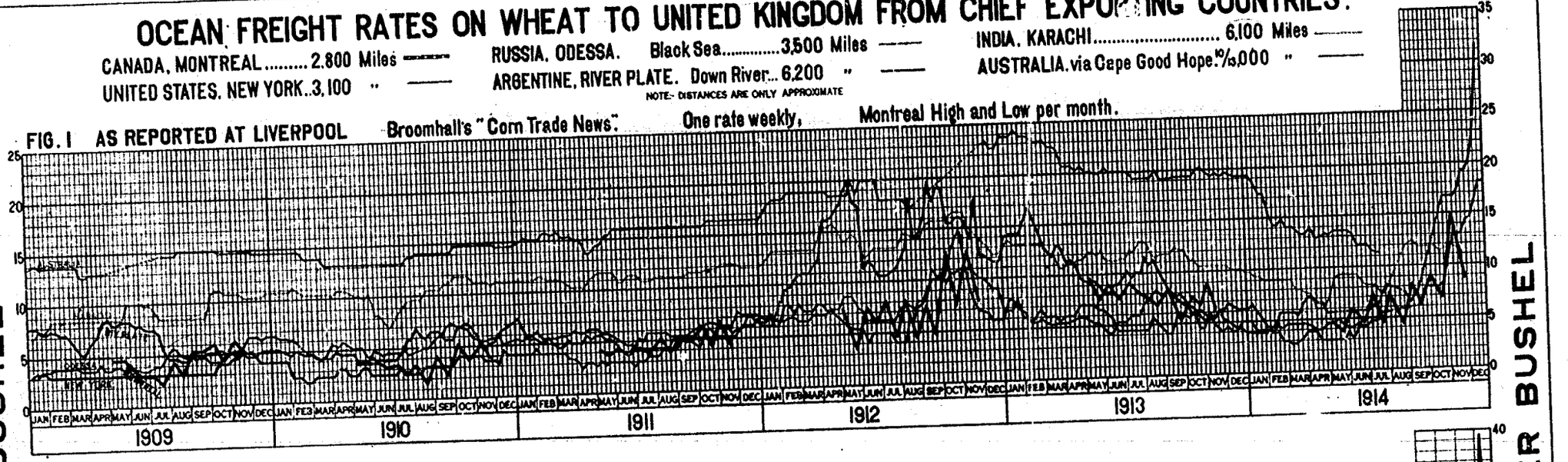
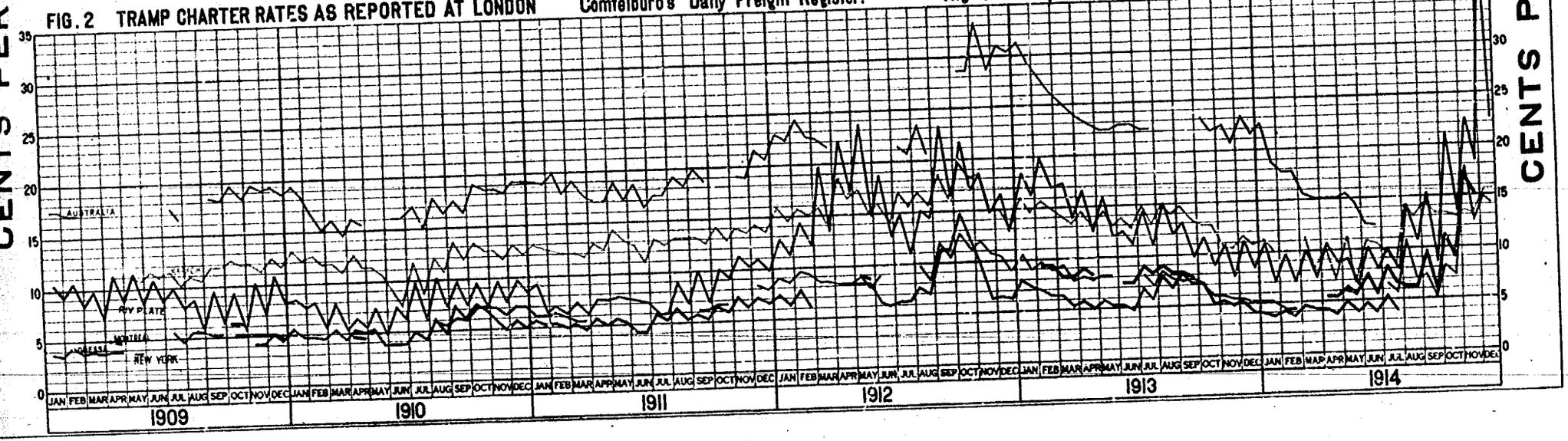


FIG. 2 TRAMP CHARTER RATES AS REPORTED AT LONDON Comtelburo's "Daily Freight Register." High and Low per month



suggested that the facts clearly indicate that the liners in the Montreal trade first take what Canadian wheat they want; that the liners at Boston, New York, Philadelphia, and Baltimore have the second call on the business; and that when the liners are satisfied the tramps enter the trade and they enter it first at Baltimore and Philadelphia, and when the rates become relatively high they go to Montreal.

Fig. 2 of diagram 19, with its regularity of form, represents the capacity for wheat of the liners in the Montreal trade during the summer, and those in the St. John and Halifax trades in the winter. With liners, the capacity for wheat is, under ordinary conditions, the amount of cargo space not engaged for higher class goods. In the latter part of the season better-paying freight offers more freely and less space is left for wheat, but if the rates on wheat go up sufficiently the liners may enlarge their accommodation for freight. That the liners in the Montreal trade have the first call on the business is indicated, not merely by the comparative regularity of their takings, but by the fact that they sometimes take nearly all the wheat offering. So long as the Montreal liners will carry wheat across the Atlantic at rates not exceeding those of the liners from New York or other United States ports, the through Canadian route should be cheaper than the through routes by way of the United States, because the rates on Canadian wheat from the interior to Montreal are generally, if not always, lower than to the United States ports. Whether costs per unit of cargo on the Montreal route justify as favourable a rate as from New York may later be inquired into, as may also the practical effects on rates of the provision inserted in the contracts between certain liner companies and the Dominion Government in connection with the granting of subsidies, to the effect that rates from Montreal must not exceed rates from New York. At this point, however, it is sufficient to say that the Montreal liners seem to have the first choice of Canadian export wheat. Their immediate competitors are the liners at United States ports.

When the Canadian liners have no more space they care to devote to wheat at current rates, the competition for the balance is between the liners along the United States coast and the enormous fleet of tramps scattered throughout the world. If the United States liners desire more cargo they can secure what they want of the Canadian surplus wheat by making rates slightly below the basis fixed by general tramp competition. As Europe buys only so much wheat for delivery each month, there is not always serious conflict between seaboard shipments of Canadian and United States wheat, because if more Canadian wheat has been purchased for shipment in a certain month it is probable that less United States wheat will be pressing for export at that time. A glance back at the wheat lines running to Boston, New York, Philadelphia and Baltimore, in diagram 18, suggests that these lines are in proportion to the liner capacities at these various ports and do not represent any wild scramble for business.

After the liners along the North Atlantic have engaged to carry all the Canadian wheat they are prepared to take within the rates fixed by tramp competition, what remains over of the wheat must seek tramp vessels and offer rates to attract them. Charter rates from Atlantic range ports are regularly lower than from Montreal or from ports on the gulf of Mexico, and reasons could be advanced why they might be expected to be somewhat lower. Whenever tramp rates from Atlantic Range ports are lower than from other ports accessible to Canadian wheat, then the tramps will probably first enter the trade at Baltimore and Philadelphia, for the reason that these two ports, with the sanction of the Interstate Commerce Commission, enjoy a differential on ex-lake grain of three-tenths of a cent per bushel over New York and Boston, and, if a shipper can engage a tramp at Baltimore or Philadelphia for the same rates as from New York or Boston, he can save three-tenths of a cent per bushel by shipping from the former ports. On all rail shipments from or through Chicago, Baltimore enjoys a slightly higher differential than Philadelphia, and it may be for this reason Baltimore stands first in tramp shipments of grain. Tramp vessels may occasionally be in such positions that they are willing to report at Montreal on favourable terms

as compared with any other North Atlantic port, but as a general rule rates offered for tramps from Montreal must be relatively high.

The above general interpretation of the facts adduced is offered only as a tentative working hypothesis. Very many more facts and conditions must be taken into consideration. Liners sail from United States ports to many ports not reached by liners from Canadian ports and some shipments may not be open to competition by Canadian liners. Again, wheat merchants in the United States buy Canadian wheat on the depressions in price accompanying extreme marketings and help to carry over the excess. The peaks shown in diagram 18 as diverted to the United States, appear in reduced form in the shipments from United States ocean ports, the balance being spread over several months to meet the conditions of European demand. In so far as individuals, whether merchants of the United States or of Canada, may choose to finance and to hold this excess in the United States, there is brought into play a diverting force of a different kind from those just considered. The whole appearance of the facts so far assembled suggests, however, that general transportation conditions on the ocean are among the fundamental causes of wheat diversion and that these other influences and motives may be only modifying factors.

But why are there not more liners in the Canadian trade? If the large surplus of Canadian wheat and other products which now seeks other ports of export could be carried to Montreal at least as cheaply, and generally more cheaply, why have not more vessels entered the regular trade between Canada and Europe? The distance on the Montreal route is rather shorter than on other routes and the time cannot be longer; what, then, of the load factor?

Load factor on the North Atlantic.—The importance of load factor in the transportation problem has already been discussed (p. 25). Liners are vessels committed to particular routes, and, in order that they may be able to command their share of competitive traffic, they must so arrange their load factor that they can afford to meet the rates of liners on alternative routes, and also the rates fixed by tramps on the basis of world-wide supply and demand.

To satisfy the conditions in any trade there must be vessels enough available to carry the peak of the load, but it may not be possible to keep regularly on any route liners enough for this purpose. With traffic irregularly offered the season's load factor might be so unfavourable and costs per unit of cargo so high, that competitive rates could not be met.

Canada's total exports to Europe of all classes of goods increased, with irregular monthly fluctuations, to a great peak in the autumn months, while the imports from Europe are pretty regularly distributed throughout the whole year. Measured by value, Canada, in the calendar year 1913, exported to Europe, in January, February, March, and April, goods to the value of $43,146,701; in May, June, July, and August, goods to the value of $69,838,920; and in September, October, November and December, goods to the value of $124,894,678.[1]

On the other hand, Canada imported from the United Kingdom, from which the greater part of its European imports come, in the first four months of the same year goods to the value of $46,646,995; in the second four months, goods to the value of $51,840,477; and in the last four months, goods to the value of $42,035,837.[1] The goods shipped to Europe are largely natural products of great bulk in proportion to value, while the goods imported from Europe, being chiefly finished products, occupy comparatively little cargo space. If the Canadian routes were to be supplied with liners capable of handling Canada's total trade with Europe, these liners must be numerous enough to carry the maximum shipments in any month, and in that case would have

[1] Compiled from records of the Customs Department.

extremely light cargoes eastbound during most of the rest of the year and westbound perhaps not enough cargo for ballast at any time. No account is here taken of the passenger business and of mail or other subsidies, which must affect the ability of liners to successfully handle somewhat irregular freight loads.

Under these conditions of Canadian trade with Europe, what load factor did the vessels on the Montreal route work out in the season of 1913? There was unloaded at Montreal in that season from all European countries 733,001 tons of freight, and there was loaded at Montreal for Europe, in liners and in tramps, 1,647,145 tons of cargo, giving a ratio of 2·23 eastbound to 1 westbound.[1]

Facts are not accessible to show the exact load factor on each of the competing United States routes. Although the quantity of freight to be moved inward, and the quantity to be moved outward, must primarily determine the distribution of shipping, statistics of tons in and tons out are obtainable for very few ocean ports in the world. National revenues are collected on values and port dues on registered tonnage, and there are records of the numbers and sizes of vessels and how much their cargoes would probably sell for, but little to show how full the vessels were, in or out. In the absence of published statistics for the United States one or two statements from authoritative sources may be cited. In his work on "The Ocean Carrier" (p. 41), Prof. J. Russell Smith, of the University of Pennsylvania, a recognized authority on transportation, says:—

> North America sends across the North Atlantic more than twice as many tons of freight as Europe sends back.

In his evidence at Washington in January, 1913, before the Committee on the Merchant Marine and Fisheries (Investigation of Shipping Combinations, Hearings, vol. 1, p. 610), Mr. Franklin, Vice-president of the International Mercantile Marine Company, quoted figures with respect to the Atlantic Transport Line, running between London and United States ports, showing cargo space not filled in the year 1912. These figures show that on the average the vessels of the Atlantic Transport Line brought to the United States on each trip 5,100 tons of cargo, and took back to London 10,784 tons, or a ratio of 2·11 to 1. The following direct question and answer are recorded:—

> Mr. Hardy.—So that you export somewhere between two and three times what you import, is that the fact?
>
> Mr. Franklin.—That is right.

These statements are in general accordance with the load factor existing in the Montreal trade, and theoretically it might be expected that substantially the same load factor would be found at all principal North Atlantic ports. Sailing eastbound, a vessel cannot carry more than a full load, or say a load of 100, and a large part of the bulk freight from North America can move as easily through one port as another and at only slight differences in cost. Large quantities of United States grain can without any difficulty be brought to Montreal and Canadian grain to the Atlantic Range ports of the United States. Under these conditions, why would a line company keep a vessel on the Montreal route, or the New York route, or any one route, if it could secure on that route an inward load of only a little less than 50, when an inward load of perhaps 75, or even 60, could be obtained upon another route? The vessel with the regular inward load of 75 could make sufficient concessions in rates to attract to any North Atlantic ports all the cargo it could carry eastbound. Under free competition vessels would at once be diverted from the less profitable to the more profitable route until an equilibrium was established; and no agreements or understandings could long prevent an adjustment in some manner. Conditions change every season, and the whole subject is complicated by passenger traffic, subsidies, port

[1] Compiled from records of the Customs Department.

differentials, general railway interests, and innumerable other matters. It is not improbable, however, that among the liners load factor tends to be equalized all along the North Atlantic coast.

What inward cargo was secured by the vessels on the Canadian routes? In the fiscal year ending March 31, 1914, Canada imported from Europe goods to the value of $181,762,545. Of this total, goods to the value of $169,527,341 arrived at Canadian ocean ports, and goods to the value of $12,235,204 arrived in transit through the United States.[1] That is to say, 93·27 per cent of Canada's purchases in Europe came directly to Canadian ocean ports. In the same year, Montreal received from all countries goods to the value of $6,331,989 in transit to the United States on through bills of lading, and Canada exported to the United States "goods not the produce of Canada," that is, goods imported from other countries but not on through bills of lading, to the value of $13,575,474.[2] It is hardly practicable to determine how much of this freight, of a total value of $19,907,463, handled en route to United States points, came from Europe, but making reasonable allowance it is evident that the freight carried inward from Europe by vessels sailing to Canadian ports must have been practically equal to all freight from Europe that was destined to Canada, and on the Montreal route this gave an inward load of a little less than 50 in comparison with the outward load of 100.

If Canadian ports receive practically all the freight belonging to Canada, and if Montreal receives its full share, what would happen if vessels enough were introduced into the Montreal trade to carry all the Canadian wheat exports? If in 1913 this has meant a doubling of the total number of vessels between that port and Europe, would each vessel have had an inward load of only 25 against its outward load of 100, or is there any way in which more intransit freight for other countries could have been secured? If this latter had not been found practicable, then presumably the vessels in the Boston, New York, Philadelphia, and Baltimore trades would have retained an inward load of approximately 50. Could such a condition have been maintained, and how would the cost have been distributed?

Canada has never yet been able to secure at Canadian ports enough vessels to carry all the Canadian exports; that is, no measures so far taken to that end have been sufficient to seriously disturb the simple economic balance of the load factor along the North Atlantic coast. In so far as the proposed Georgian Bay canal would be expected to very greatly increase the proportion of Canadian exports through Canadian ocean ports, it will clearly be necessary to arrive at some estimate of the permanent counteracting force of the general load factor, or at least of the cost involved in maintaining an ocean service on a less favourable economic basis than that prevailing on competing routes.

Canada's position in relation to the problem of ocean transportation is different from that of any other country at the present time, for no other country has access to so many ports in a foreign country that can be reached almost as conveniently and as cheaply as its own ports, and no other country except the United States, is served by an ocean trade in which there are so many liners, which, therefore, dominate its export traffic.

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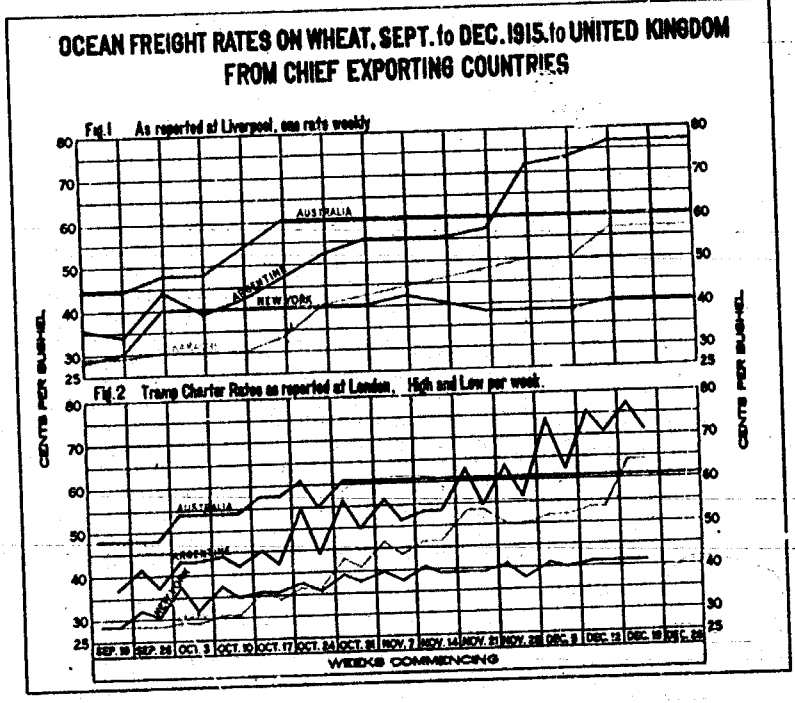
[1] Trade and Commerce Report, 1914-15, Part I, p. 46.

[2] Report of the Department of Customs, Trade and Navigation, 1914.

DIAGRAM Nº 21

OCEAN FREIGHT RATES ON WHEAT, SEPT. to DEC. 1915. to UNITED KINGDOM FROM CHIEF EXPORTING COUNTRIES



OCEAN FREIGHT RATES IN 1915.

It has not been found possible to complete for this report a comparative examination of the movements of traffic and the courses of prices and of freight rates under the abnormal conditions of 1914 and 1915. A few facts concerning ocean freight rates on wheat in the last four months of 1915 may, however, be briefly considered by way of supplement to the general survey of ocean rates for the six years immediately preceding the war.

In diagram 21 are shown the movements of wheat rates in the principal ocean trades between September 19 and December 31, 1915.[1] In fig. 1 rates on the first day of each week have been furnished, as in the case of diagram 20, by Broomhall's Corn Trade News, and for fig. 2 the high and low tramp rates per week by Comtelburo's Daily Freight Register. As Montreal rates seem to have kept within the limits of the New York rates during all this period, only the latter are quoted.

It will be noted that the whole range of rates is extremely high. For the greater part of the period liner rates in the New York trade were 40 cents, and at one time touched 42 cents per bushel. Such rates were never before reached under modern conditions. In 1910 the average wheat rate from New York was 3·18 cents per bushel, and for the five years 1909 to 1913 the average was 4·83 cents per bushel.

Rates in the North Atlantic trade had witnessed a spectacular rise which culminated in the week of September 26 in a final leap of 10 cents per bushel. In its course the New York rate line had crossed the Karachi line, although the Karachi route is twice as long, and about October 10 the New York rate was higher than the Argentine rate, while the Australia rate was comparatively very little higher. At this period North Atlantic rates were not only unprecedentedly high in themselves, but were relatively higher, when compared with other rates, than at any previous time. The diagram shows by what stages the rates, thus thrown into confusion by the upheaval in the North Atlantic trade, began to readjust themselves. It will be observed that this readjustment was by way of a rise in the other rates and not by a drop in the New York rate, and that the readjustment was not quite accomplished up to the end of December, chiefly because the Australia rate had not continued its rise. Were these developments in accordance with the laws and tendencies suggested as generalizations from the facts of normal times or to what extent had new forces been introduced?

During the progress of the war so many vessels had been requisitioned for military purposes, and so many interned and destroyed, that the world's mercantile fleet of ocean carriers had suffered a material reduction. Overseas trade had also at first been seriously affected, but the war soon created a large trade of its own and with an improvement in general commerce the demand for tonnage had become very insistent. There followed an uncompromising application of the law of supply and demand.

In the autumn of 1915, the United States and Canada were the only important sources of wheat supply for Europe. Southern Russia and Roumania were still blocked at the Dardanelles, and Northern Russia could send out only very small quantities through Archangel; the Government of India was in control of the supplies in that country and was conserving the surplus; Australia, owing to the partial crop failure in 1914 and pending the harvesting of the new crop, had nothing to export; and the Argentine had already disposed of the greater part of its 1914-15 surplus. Demand for cargo space for wheat thus became extraordinarily active in the North Atlantic trade.

[1] Appendix, Table 24, p. 125, Statistics.

So much space had never before been needed in that trade, for North America was called upon to furnish nearly all the import requirements of Europe. The first effects on rates were therefore found in the North Atlantic trade. At the new high level of rates the North Atlantic trade attracted vessels enough to continue to ship each week ample supplies according to the estimated average weekly needs of importing countries, but as rates did not weaken there was apparently no large surplus of vessels available.

India shipped no wheat at all during this period but made small shipments of barley. The Argentine shipped some wheat and a good deal of corn, and Australi was waiting for the new crop. There was no pressure in these trades, at least for prompt shipment. India's harvest was some months distant, but it soon became necessary for Australia and the Argentine to engage tonnage for the movement of the new wheat crop, which would be ready for market in December and January. In Australia, in view of the alarming conditions in the freight market and in order to eliminate the element of local competition, the Government assumed the exclusive management of export shipments and it was reported that certain firms of ship brokers had been commissioned to engage up to 1,800,000 tons of freight room for wheat. In the Argentine the business was left in private hands.

In the regular line trade with the Argentine and with Australia were many vessels, and other vessels would from time to time sail for the South Atlantic or for the Far East with special outward cargoes, but the capacity of these vessels would not be adequate to move the quantities for which shipment was desired, and to obtain additional vessels meant offering rates equally profitable with those prevailing in the North Atlantic trade. The United States and Canada had enormous surpluses, and could continue to employ shipping. By the time its new crop was ready the Argentine had bid fully the equivalent of the New York rates, but the Australian Government had fixed an arbitrary limit of 95 shillings per ton (about 61 cents per bushel), beyond which it would not authorize a contract. Under these conditions, Australia could not expect to divert free tonnage from the other trades, but might secure such vessels as had other business in the Far East.

In 1910, when the average New York-Liverpool "berth" rate on wheat was 3·18 cents, the average River Plate-Liverpool rate was 5·78 cents, or a ratio of 1 to 1·82. If the New York rate of 40 cents per bushel be multiplied by 1·89, the result is 72·80 cents. Compared with the average New York rate for the whole five years, 1909-13, of 4·83 cents per bushel, the average Argentine rate was 8·60 cents, giving an average ratio of 1 to 1·78. The distance is about 1 to 2, but modified by time and load factor. The ratio between the average New York and Australia rates for the same five years was 1 to 3·46, the distance on the Australia route being 3¼ to 4¼ times as great as on the New York route, the shorter Australia routes being subject to Suez Canal tolls and delays. The Karachi route is about twice as long as the New York route, but its average rate for the five years was about 2·41 times the New York rate, perhaps influenced by the passage through the Suez canal. The Odessa route is only about 15 per cent longer than the New York route, and its average rate was about 1·23 times the New York rate. These calculations are based on the Liverpool quotations, and can be accepted only as a rough and ready measure of comparative rates. The tramp rates cannot be satisfactorily averaged because in some trades quotations are so scattered, but it would appear that on the whole the New York basis was relatively higher than with liner rates, while, compared with the other trades, Odessa and Karachi had relatively lower tramp rates than liner rates. Contrary to conditions before the war, tramp rates in the New York trade in September, October, and November, 1915, were rather lower than liner rates, but the ranks of the liners had been thinned by requisitioning and interment, and in the enlarged trade they had become a much smaller factor than formerly and, moreover, the great quantities of higher-class freight offering made it less necessary to underbid the tramps for wheat.

Estimating from the experience of the above five years, it would be necessary for Australia to offer a rate of approximately $1.35 per bushel in order to attract vessels that could find employment in the New York trade at 40 cents per bushel, or in the Argentine trade at about 70 cents per bushel. Such a rate would, however, be absolutely prohibitive under competitive conditions; and yet it would be relatively not as high a rate as Australia paid in 1910, when the average rate was only 14·13 cents per bushel.

The conditions in 1915 thus bring out clearly one practical bearing of competitive ocean freight rates on international trade, which might not strike the attention in normal times. Rates tend to rise with the pressure of demand, and competition then tends to adjust rates in every trade to the same basis of earning value to the vessel, but as rates go up the spread widens in direct ratio, and it is the spread which makes the trading margin for one country as against another. When the New York rate is 4 cents per bushel, the Argentine rate 7 cents per bushel and the Australian rate 13 cents per bushel, North American wheat at the seaboard has a spread of 3 cents per bushel over Argentine wheat in the same position, and 9 cents per bushel over Australian wheat; but when the basis for New York has moved to 40 cents per bushel the spreads have become respectively 30 cents per bushel and 90 cents per bushel. Vessels earn no more in the long-voyage trades than in the short route across the North Atlantic, and there is no discriminaton, but North America has been established in an almost impregnable trading position. If, under these conditions, Europe must have wheat from these three countries, North America can sell its surplus at a handsome profit before the Argentine can get cost and before Australia can export at all. The laws of supply and demand and of competition operate in commerce as well as in transportation. High ocean freight rates confer a temporary commercial advantage on countries served by short-voyage trades, but ultimately the injurious effects of excessive rates must, of course, tend to react even on the countries at first benefited.

Western Canadian wheat fields are further from the ocean than the Argentine wheat fields, and although interior transportation costs per mile in Canada are more favourable, the Argentine is in a good competitive position when the spread in ocean rates is only from 3 to 6 cents per bushel, but when the spread is 30 cents per bushel, Western Canada can obtain a good price for its wheat, can absorb the costs of all-rail transportation in the winter months and then can undersell Argentine wheat in Europe even in the very months in which Argentine wheat is intrinsically cheapest. Australian wheat fields are much more convenient to the ocean than those of Western Canada, and when ocean rates are only from 10 to 12 cents per bushel higher than the New York rates, Australian hard wheat can compete with Canadian hard wheat in the markets of the United Kingdom, but when very much greater spreads appear, this becomes impracticable. Even the arbitrary maximum rate of 61 cents per bushel fixed by the Australian Government in October, 1915, left a spread of about 20 cents per bushel, which is much greater than the difference in interior costs; and it will be instructive to learn how much wheat could be exported from Australia at a rate not half as profitable to the vessels as the rates prevailing in other trades, and whether compensation was obtained from rates on other goods inward or outward. Australia might, of course, be relieved from the dilemma thus created by war conditions through the extension of control by the governments of Europe over ocean traffic and shipping during the continuance of the war.

It is evident that not only do the general conditions of ocean transportation largely determine the distribution of international commerce, but that in the one particular of a change in the basis of freight rates, and even when there is no discrimination for or against any route, a factor exists of such varying power that it may seem to produce different kinds of effects according to the degree to which rates are raised or lowered.

BANK RETURNS IN CANADA.

Trade and traffic must be financed, and therefore bank resources and methods, rates of interest, and rates and facilities in connection with international exchange, are fundamental conditions of production, commerce and transportation. Financial conditions may assist or check development and influence the direction it takes, and may be among the causes of the distribution and diversion of traffic. For these reasons, financial facts should be examined together with all other underlying facts, and with equal care. At this stage only a few of the main features of the resources and business of the chartered banks of Canada will be presented.

To what extent do the Canadian chartered banks assist in the financing of ordinary business in Canada? What proportion of their resources do they devote to this purpose? How is the load they carry in this respect distributed throughout the year? As safe and convenient depositories, banks gives service to the public, but their great service to business is in the advances they make to facilitiate the turn-over of business. Most of the advances for commercial business purposes appear in the accounts as "Current loans and discounts in Canada." This class of loans only will be considered, in its relation to other important banking facts; although it should be borne in mind that the banks also make other loans in Canada, such as loans to Governments, and "Call and short" loans on the security of stock, debentures and bonds, which are not all in connection with Stock Exchange business, but are often the form in which advances are made for commercial business. Call loans and loans to Governments are not relatively very large and the totals do not widely fluctuate.

In accordance with the Bank Act, the chartered banks submit to the Minister of Finance statements covering the condition of their principal accounts at the end of each month. These monthly returns contain all the main items of a balance sheet which are of direct concern to the public. The assets statement gives the measure of the total resources of the banks and sets forth what they have done with these resources, whether they have loaned them to clients, invested them in securities or buildings, or hold them in their vaults in the form of coin or Dominion notes. The liabilities statement shows where the banks have obtained these resources, whether from shareholders, from depositors, from their power to issue banks notes, or from miscellaneous sources. In diagram 22, fig. 1, the important items of these monthly returns bearing on the financing of general business in Canada are presented for the six years 1909 to 1914. This diagram gives amounts in dollars, while diagram 23 gives the relations in percentage of these amounts to the total resources of the banks in each month.[1]

Line, No. 1 in fig. 1, diagram 22, represents the total assets of the banks at the end of each month, that is, the total resources of the banks. The ability of the banks to give service must bear a direct relation to their total resources, varying as these resources vary. From the beginning of 1909 to the middle of 1918, the total resources of the Canadian chartered banks steadily increased, but in a slightly waving line, indicating small relative expansions in resources about the months of May and June and somewhat more marked expansions in October and November, the latter partly accounted for by the exercise of the power to issue excess currency at that time. Whether or not the increase in the resources of the banks kept pace with the increase in general trade and therefore with the need for banking accommodation will not here be inquired into; but it is clear that the resources actually in hand at any particular time will set the limits within which service can be performed.

1 Appendix, Table 37-38, pp. 128-133, Statistics, 1909-15.

DIAGRAM Nº 22

MONTHLY RETURNS OF CANADIAN CHARTERED BANKS
1909 TO 1914

FIG. 1. CURRENT LOANS IN CANADA AND OTHER PRINCIPAL BANKING ACCOUNTS.

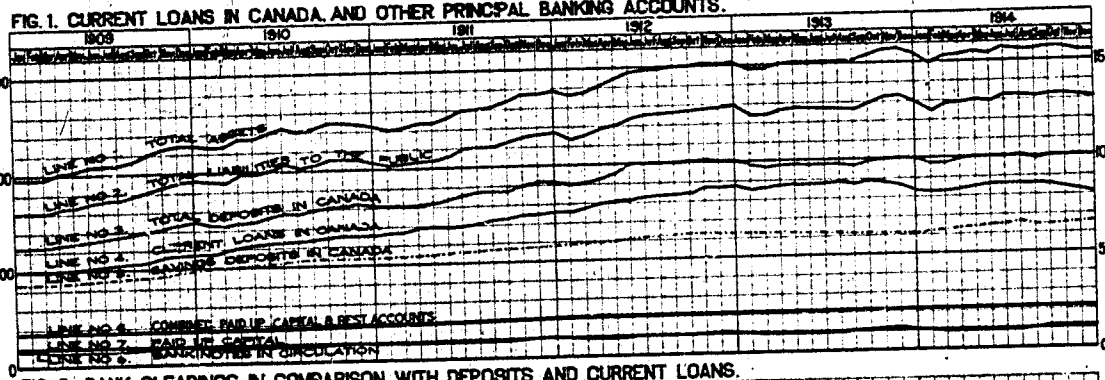
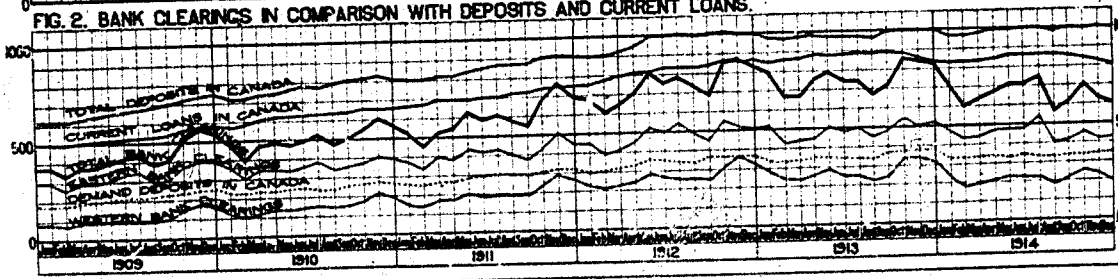


FIG. 2. BANK CLEARINGS IN COMPARISON WITH DEPOSITS AND CURRENT LOANS.



Line No. 2 indicates total liabilities other than liabilities to shareholders. Line No. 2, therefore, divides the total resources of the banks into two parts. From the base of the figure to this line is the part of the total resources derived from depositors and other creditors, and created by the exercise of the power to issue bank notes. This is by far the greater part of the banks' resources. Between line No. 2 and line No. 1 is the part supplied by the shareholders in the form of paid-up capital, reserve accounts and profit and loss balances. It is the irregularities in line No. 2 that cause the irregularities in line No. 1; that is, it is the variations particularly in the deposits and bank note circulation that occasion the fluctuations in the line of total resources, the amounts belonging to shareholders remaining fairly constant but showing a steady increase.

Certain particulars are given separately in the remaining lines. Starting at the base of the figure, the red line, line No. 8, gives the greatest amount of bank notes in circulation at any time during each month. The power to issue bank notes is limited to the amount of paid-up capital, plus any amounts deposited in the Central Gold Reserves, but provision is made in the Bank Act for the issue of additional bank notes during the usual season of moving the crop to an amount not exceeding 15 per cent of the combined unimpaired paid-up capital and rest funds of the banks, and certain further extensions of this power were granted as temporary war measures. Bank notes are issued only as there is a demand for a circulating medium of this kind, and it will be noted that, except in the autumn months, the demand has not led to the continuous full exercise of the powers of the banks in this respect.

Line No. 7, representing paid-up capital, is practically a straight line with a slight steady rise. The paid-up capital forms only a small part of the total resources of the banks. The "rest or reserve" funds of the banks have grown more rapidly than the paid-up capital until they are almost equal to the latter in amount. The rest funds added to the paid-up capital give the total fixed contribution of the shareholders to the resources of the banks, and these combined rest funds and paid-up capital accounts are indicated in line No. 6. It is the amounts represented by line No. 6, plus profit and loss balances, that make up the spread between line No. 1 and line No. 2.

Canadian chartered banks do not confine their business to Canada, but participate in the international operations of Canadian trade and Canadian finance, and through their own branches or through agencies they receive deposits and make loans in other countries. Loans and deposits elsewhere than in Canada are included in the totals of the assets and liabilities, and will later be referred to, but in this diagram only deposits in Canada and current loans in Canada are given.

Deposits by the public are of two kinds, those payable after notice or on a fixed day, commonly called "savings department" deposits, and those payable on demand, which ordinarily earn no interest but form the funds against which bank cheques are issued. Banks must be prepared to meet instantly all demands upon them, and cannot, therefore, loan out or invest for fixed terms all the funds held by them, but must keep in cash and immediately realizable securities such amounts as may be necessary to meet any probable demands. As a basis for making current loans, savings deposits can be counted upon in a different way from demand deposits. For this reason savings deposits in Canada are shown separately in the broken yellow line, line No. 5. It will be noted that deposits of this kind increased throughout the period without any very marked variations. If demand deposits are added to savings deposits, the result is shown in line No. 3, which gives the total deposits by the public in Canada.

Coming now to line No. 4, we have the amounts advanced each month in the form of current loans and discounts in Canada. These amounts, as already pointed out, do not include call loans in Canada or loans to Canadian Governments, and, of course, do not include loans made elsewhere than in Canada. It will be noted:

1. That line No. 4 moves steadily upward from February, 1909, to September, 1913. The total of current loans increased year by year and almost month by month. Indeed, in the above fifty-five months there were only seven occasions on which the current loans in any month were not greater than those of the preceding month. So even an expansion of business is rather remarkable. It is clear that there is nothing erratic in this part of the banks' business. So far as totals are concerned, there was no withdrawing of resources from loans in one year or in one part of the year, and no sudden expansions at any time. Total loans were not reduced in the summer months to accumulate resources for the autumn, for summer loans were in each year greater than the spring loans had been, and the loans each autumn were greater than the loans in the summer, while the loans the following spring were greater than in the previous autumn. Loans expanded as total resources increased, but obviously at a slightly more rapid rate.

2. That current loans in Canada, which are made for fixed terms, were greater than the deposits in Canada placed in the banks for fixed terms, or subject to notice, and that the current loans increased faster than the savings deposits.

3. That after September, 1913, loans were actually reduced in amount, when the reaction in business had set in, and that the trend of the line became downward.

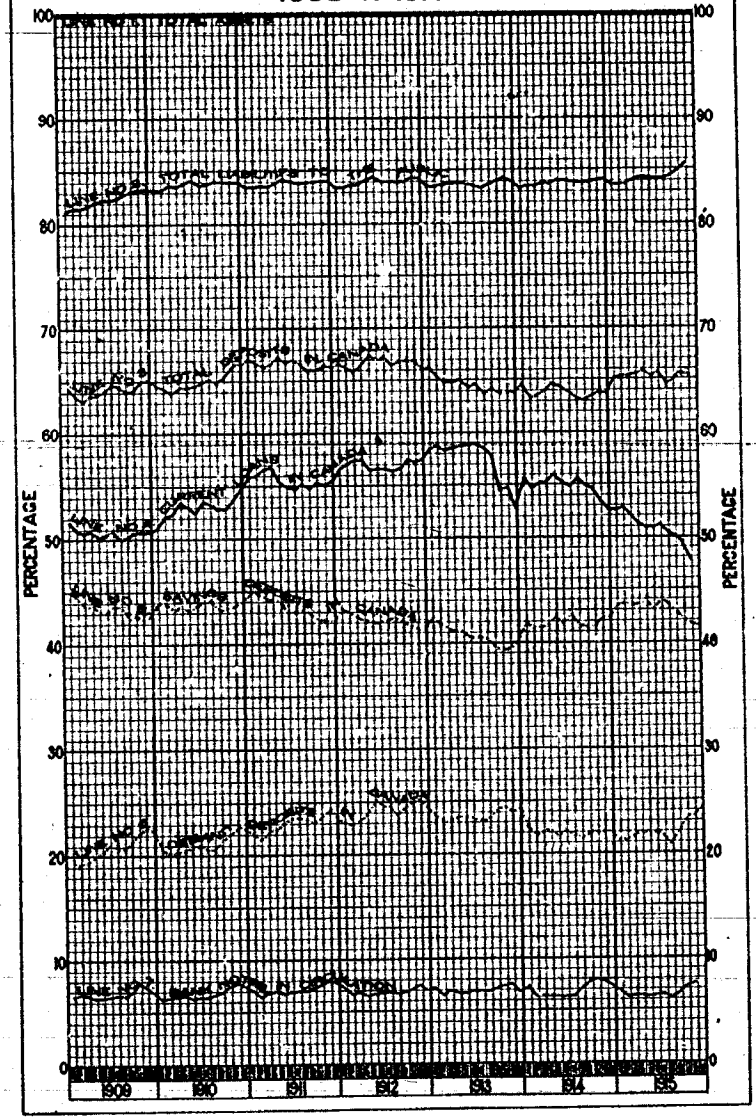
Business in Canada rapidly expanded from 1909 to midsummer, 1913, but varied in activity and volume at different periods of the year. Bank loans had no important seasonal variations. The service rendered by anything depends, however, upon how often it is used in a given time. If business in Canada were turned over only once a year, and if bank loans were all for twelve month periods, then only one service in a year would be performed by the resources devoted to bank loans; but if business were turned over twice a year and loans averaged six months, then the effectiveness of the loans would be double, and use every three months would quadruple the service. While no facts have been obtained to show the average time of turn-overs in general business in Canada, nor the average term of current loans, there can be found in the records of bank clearings evidence as to seasonal activity in the use of such banking resources as were at the disposal of individuals. Most business payments are made by cheques drawn on demand deposit accounts, which accounts are partly at least the product of bank loans. If a cheque passes from a client of one bank to another client of the same bank the exchange is adjusted within that bank without any public record; but if the exchange takes place between clients of different banks then the adjustment is made through the clearing house and the totals so adjusted at the various clearing house centres are regularly published. Clearing house returns are, therefore, the records of the amounts that change banks from time to time.

In fig. 2 of diagram 22 the monthly totals of bank clearings in Canada are shown,[1] the solid black line giving the total clearings in each month for all Canada, the dotted black line indicating the proportion of the clearings in eastern Canada and the broken line the proportion in western Canada, including Fort William after the organization of the clearing house there in 1911. The lines of total deposits, demand deposits and current loans in Canada are added to this figure so that comparisons of amounts involved can be made. It will be noted that bank clearings show a wide range of fluctuations, but that each year has the same characteristics, an increase in May and July and a much greater increase in October and November. There are some differences between eastern and western clearings. In the last quarter of the year, from 1909 to 1913, bank clearings were more than double the amount of the demand deposits. If it could be assumed that only cheques on demand deposit accounts, and bank notes withdrawn from such accounts, were cleared, then in the last three months of the year all the amounts in all demand deposit accounts in Canada changed banks

[1] Appendix, Table 39, p. 134, Statistics, 1909-15.

DIAGRAM Nº 23

PRINCIPAL BANKING ACCOUNTS AS PERCENTAGES OF TOTAL RESOURCES 1909 TO 1915



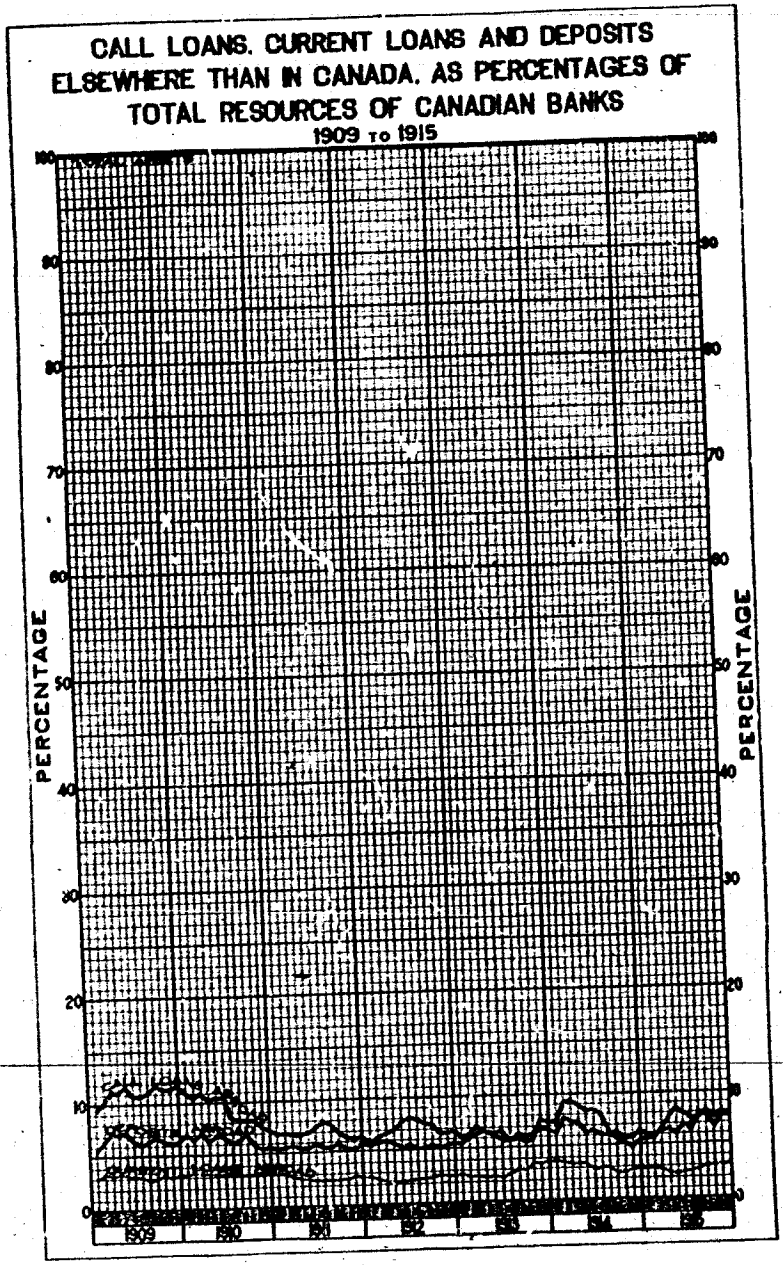
every two weeks. On several occasions an amount equal, or almost equal, to the total of current loans was exchanged between banks in a month. This is great activity; and it takes no account of the very large aggregate of adjustments made within individual banks which do not appear in the clearings. There is evidently business pressure twice a year which is met by the frequency of the turn-over of the banking resources at the disposal of individuals, but the total of the resources the banks afford to individuals does not greatly vary. Perhaps so rapid a turn-over in the autumn is undesirable and implies undue strain, or perhaps only at that time is the financial machinery working to full efficiency.

Further interesting light is thrown on current loans in Canada when percentages are examined. In diagram 22 the current loan line, line No. 4, is one of the most regular, but in diagram 23, where the various accounts are represented in percentages of the total resources, it becomes the most irregular of all the lines. Bank deposits and other funds fluctuated, but the loans were very steadily maintained and therefore the percentage relation showed marked changes. Then it is manifest that between 1909 and September, 1913, the banks put out in current loans an increasing percentage of their resources each year. Current loans in Canada expanded relatively faster than any other items in the accounts. The contraction, after September, 1913, is very striking in the percentage line. But perhaps the most interesting of all the points in connection with this line is that it plainly shows that the peak load is encountered by the banks, not in the autumn, but in the spring months. In every year this is true. With the aid of a little greater bank note circulation, then required, with slightly greater deposits and with greater activity in the turn-over, the banks can handle the rush of the autumn business and the moving of the crops with a smaller relative dead load than falls upon them when the activity of settlement declines after the turn of the year and it becomes necessary to carry over for several months what was not liquidated in the autumn. If, according to sound banking practice, there is only a certain percentage of resources which can safely be devoted to current loans, then it is clear that, as business is at present organized in Canada, a strain tends to fall upon the banks between January and May. This is a very important fact.

If it should be decided, for example, that it would be in the interests of the country that a larger proportion of the wheat should be held over so that excessive autumn marketings could be avoided, the question would arise whether with the present banking resources it would be practicable to carry a much heavier load from January to May, and this would lead to such other questions as to how banking resources could be increased, or how the business system could be altered to better distribute the load and to produce more frequent turn-overs and particularly in the spring months. How far does pressure from the necessity of securing liquidation at least once within the year account for the dumping in the autumn of many products, including wheat?

Do Canadian banks devote a proper proportion of their resources to current loans in Canada? Could still further assistance be rendered in this way, consistently with sound banking and the preservation of the absolute essentials of safety and of cash and liquid reserves against every probable demand?

Could banking resources be increased out of local financial supplies? Banks mobilize the financial resources of a country. Have Canadian chartered banks satisfactorily performed this function, that is, are the banking resources as large as the conditions in Canada make practicable? Individual banks can be judged only according to their efforts to increase their own resources, and according to the use they make of such resources as they have. If more resources are needed, a problem would exist which might not involve special responsibility on the part of any individual bank, nor would responsibility necessarily fall solely on the banks collectively. If present banking resources are not adequate to the needs of Canadian business, would it be wiser to seek temporary additional resources to meet the times of pressure, or to


CALL LOANS. CURRENT LOANS AND DEPOSITS ELSEWHERE THAN IN CANADA. AS PERCENTAGES OF TOTAL RESOURCES OF CANADIAN BANKS
1909 TO 1915
PERCENTAGE
PERCENTAGE
100
90
80
70
60
50
40
30
20
10
0
1909
1910
1911
1912
1913
1914
1915

increase the permanent resources which would then become a permanent annual charge upon the country? Or to what extent should both means be adopted?

Or should a complete, or a partial, solution of any difficulty that may exist be sought in changes in business methods and in the speeding up of the financial machinery? If the business system of the coutry is such that long terms of credit are granted and if, because of so much one-crop farming, many series of outstanding credits can be liquidated only once a year, then the same total of financial resources will accomplish much less than under a system of more frequent settlements. Again, if settlements are evenly distributed throughout the year instead of being crowded on midsummer and the autumn, the same amount of resources will do more work. These questions are merely mentioned here as among the more obvious points suggested for consideration by the facts submitted.

With regard to the other lines in diagram 23, a few observations may be made. Line No. 1, total assets, or total resources, is, of course, a straight line at 100 per cent. From the beginning of 1910 to the end of the first quarter of 1915, the total liabilities line adhered closely to the level of 84 per cent. Whether or not the contributions of shareholders are as large as they should be, it is evident that during this period they increased proportionately as fast as the deposits and other resources of the banks. In 1909, during the recovery from the depression of 1907-8, deposits increased faster than capital and rest accounts, and again in 1915 the growing accumulations of public money in the banks, gave to the line showing liabilities to the public an upward turn.

Total deposits in Canada, line No. 3, varied only a little in percentage during the whole period, but formed a bigger percentage of the banks' resources in 1911 and 1912 than in other years. Lines Nos. 5 and 6 show separately savings deposits and demand deposits. It will be noticed that these two lines tend to approach each other from 1909 to the end of 1913. Savings deposits did not hold the same rate of increase as other bank funds, while demand deposits improved their percentage. Relatively more funds were kept in the open active accounts during 1911, 1912, and 1913. With the contraction of business in the second half of 1913, savings deposits began to show a relative increase until the revival of business in the second half of 1915. It will be observed that the fluctuations in these lines occur at different times of the year, increases in demand deposits occurring at those periods which, as indicated by the bank clearings, are the periods of greatest activity in making settlements. Savings deposits stand relatively highest at the beginning of each year. Has this any connection with the fact that the banks are able, or are willing, at that time to place a somewhat larger proportion of their funds in current loans?

Line No. 7 gives the maximum bank note circulation in percentage of the total resources. Apparently from 6½ per cent to 8 per cent of the resources of the banks is required to be in the form of a circulating medium.

Diagram 24 is added to show in its relative proportions the ordinary banking business done abroad by Canadian chartered banks. Call loans and current loans are placed and deposits are accepted by Canadian banks "elsewhere than in Canada." In diagram 24 these accounts are represented in their percentage relation to the total resources of the banks. Obviously the business done abroad is comparatively small. Canadian banks derived about 6 per cent of their total resources from deposits, and placed about 3 per cent of their resources in current loans, elsewhere than in Canada. But the banks also placed call loans abroad varying from almost 12 per cent to less than 5 per cent of their total resources. The net amount of resources employed abroad, subtracting the deposits from the call and current loans, therefore varied from almost 9 per cent to less than 2 per cent. Different banks engage in this business in widely differing degrees, but only totals can here be considered. Call loans abroad show the highest percentages in 1909 and 1910, when business in Canada had not fully recovered from a general depression. The percentage increased again in

the early part of 1914 during another general depression. Larger percentages were carried abroad in the middle of the year than in either the spring or the autumn. Funds were evidently withdrawn from abroad in preparation for the moving of the crop, but it is interesting to note that the extreme withdrawals are in most years in the month of January, in preparation, apparently, for the peak load of current loans in Canada. After the outbreak of the war in 1914 these loans were sharply reduced. Banks explain call loans abroad as a desirable investment for funds that must be kept as immediately realizable reserves.

A study of the principles and the policy of banking cannot be undertaken as being within the scope of the special problems referred to the Georgian Bay Canal Commission, and this outline sketch of certain banking conditions has been introduced principally to suggest that, in connection with these special problems, discussion should recognize that there are elementary facts in finance, and that the problem of finance is inseparable from the problems of development and of distribution.