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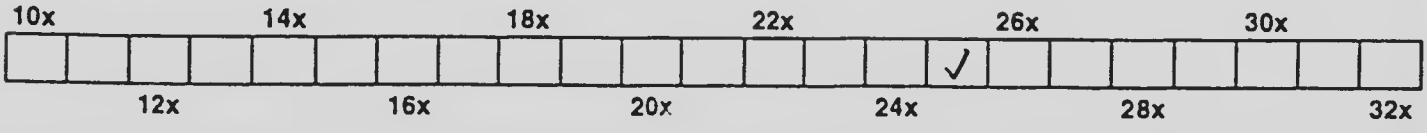

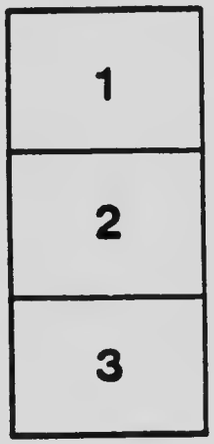

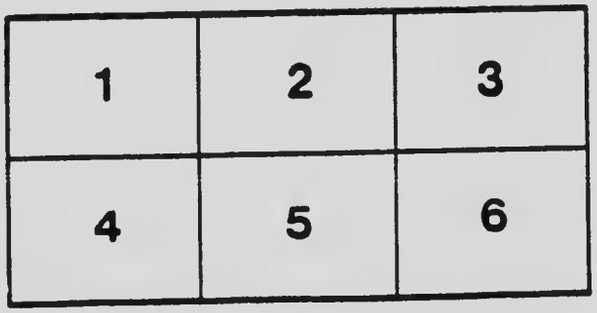

GRAIN INSPECTION IN CANADA

R. MAGILL, M.A., Ph.D.

Hon. Sir George Eulas Foster, K. C. M. G.,
Minister of Trade and Commerce.

THE DEPARTMENT OF TRADE AND COMMERCE

GRAIN INSPECTION IN CANADA

BY

R. MAGILL, M.A., Ph.D.

Chief Commissioner Board of Grain Commissioners for Canada.

ISSUED BY
THE DEPARTMENT OF TRADE AND COMMERCE
OTTAWA, CANADA.

1154—1½

The Hon. Sir George E. Foster, B.A., Ph.D., LL.D., etc.,

Minister of Trade and Commerce,

Ottawa, Canada.

Sir,—In accordance with your request, I have attempted in the following pages to give a brief account of the methods of handling grain in Western Canada in so far as these methods are the subject matter of legislation.

I have the honour to be, yours obediently,

ROBERT MAGILL,

Chief Commissioner,

Board of Grain Commissioners for Canada.

Fort William, Ont., May 5, 1914

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CHAPTER 1.

MARKETING GRAIN IN WESTERN CANADA.

Flat Warehouses.—When grain was first shipped from Western Canada it was hauled either in sacks or loose by the farmer to flat warehouses, built by grain dealers at points along the railway line. The grain was bought by the dealers, stored in the warehouse and shipped in car lots for sale in Winnipeg.

The warehouse was a simple wooden storehouse, built parallel with the railway track. A passageway across divided the house in two, and each end was subdivided into bins. The machinery usually consisted of a scale in the passageway, a trolley for pulling the sacks, and a grain cart to handle the grain in bulk. Th grain was weighed, piled loose in the bins, and drawn in the cart to the railway car (fig. 1).

Elevators were introduced shortly after the year 1880. They were designed to take advantage of the flowing property of grain in bulk, and their equipment enabled them to handle the grain much more easily than was possible with the primitive warehouse. They grew rapidly in number while the warehouse practically disappeared. At present there are in Western Canada, 2,558 licensed elevators and only 24 warehouses.

The Loading Platform.—The elevators gave rise to profound dissatisfaction among the farmers, and this resulted among other things in the introduction of loading platforms. The platform is a wooden structure on a siding on to which a farmer can drive his team, and from which he can shovel the grain into the car. When the grain has been loaded, he can either sell it on the spot as track grain, or consign it to a commission firm in Winnipeg to be sold for his account (fig. 2).

By using the platform he can protect himself from elevator malpractice, and save the elevator charges, amounting to about $17 per car. On the other hand, he has to secure the car, make arrangements for selling the grain, and load the grain into the car with his own labour. Some farmers do not, therefore, patronize the loading platform, and others cannot easily use it if they would. Farmers who live at a distance of, say, ten miles from the siding, or who have less than car lots to ship, cannot easily avail themselves of it. Naturally elevator owners do not look upon the platform with much favour, and railway operators regard them as tending to delay the cars unduly. On the other hand, there are now in existence some 1,600 platforms, and applications for new or larger ones are constantly received. Farmers undoubtedly regard the platform as both a protection against the elevators and an economical way of shipping grain, and this appears to be the case even where there are co-operative elevators operated by

A flat warehouse now used for storing coal

Fig. 1

A flat warehouse now used for storing coal

Fig 1

Farmer's waggon on the loading platform

Fig 2

the farmers. What proportion of the total grain shipped is loaded over the platforms is difficult to estimate, but it is probably about one-third of the whole.

The Elevators (fig. 3).—There are, as stated, 2,558 elevators licensed in the three provinces. Their total storage capacity is estimated as 81,720,000 bushels. None of them are owned by the Dominion Government or the railway companies, and in Alberta and Saskatchewan none of them are owned by the Provincial Governments. The Manitoba Government owned and operated a line of elevators for a time, but subsequently leased them to a company. Two or three municipalities experimented with them also, but not with the happiest results. With these exceptions, all the elevators are owned and operated by commercial companies, or farmers' co-operative companies. When the farmer takes his grain to an elevator he can either sell the grain to the operator, in which case it is called street grain, or he can hire a bin in the elevator to keep his grain distinct from all other grain, in which case it is called special binned grain, or he can store it with other grain of the same grade. If he stores the grain either in a special or general bin, he arranges with the railway company for a car, and the elevator loads the grain into the car to his order. When the grain is loaded he can either sell it on the spot as track grain or send it forward consigned on commission. The farmer hauls the grain unsacked, and bulk handling is universal (fig. 4).

Dissatisfaction and Legislation.—For several years the farmers were generally dissatisfied with the treatment they received from the elevator companies. They accused the elevators of all sorts of malpractice; of unjust weighing and grading; of paying prices that were too low and exacting charges that were too high; of not cleaning the grain; of refusing to give special bins; and of pooling profits, killing competition, and forming monopolies. Complaints were directed also against the railway companies for discrimination in distributing cars, and against buyers of grain for taking advantage in various ways of the producer. This dissatisfaction led to legislation. From time to time Parliament passed measures regulating the business of handling grain. This legislation has been codified in *The Canada Grain Act*, and it includes provisions about the construction of platforms, the operation of elevators, the distribution of cars, and the trading between the farmers and the track-buyers and commission merchants. It may be summarized as follows:

(1) Platforms.—The Act provides for both the construction of new and the improvement of existing platforms. Upon an application from ten resident farmers, the Board of Grain Commissioners investigates the need, and it has power to order the railway company concerned to build or enlarge the platform.

(2) Elevators.—Every person or company operating a country elevator must take out an annual license from, and file a bond with, the board. The board can suspend or dismiss the operator, and withdraw the license, for proven violation of the Act. The elevator charges and tariffs are regulated by the

A country elevator

Fig 3

board, and the storage and purchase tickets to be given the farmer are prescribed in the Act. The elevator scales must be inspected by the Inland Revenue Department, and there are paragraphs governing the receiving, cleaning, weighing, grading, storing, special binning and shipping of the grain. The plant, operations, books and records of the elevator are all subject to the inspection of the board, which can investigate complaints, subpœna witnesses and books, and administer the oath.

(3) Cars.—In regard to the distribution of cars, the Act is based on the principle that every shipper of grain is to count for one and nobody for more than one. The elevator company and the individual farmer are treated equally. Each is entitled to a car in turn and nobody is entitled to more than a car. The machinery for the application of this principle is prescribed, the car order book, and the method of using it. Provision is made for special cases, such as elevators that are in danger of collapsing, seed grain, damp grain and heating grain.

(4) Track Buyers and Commission Men.—These must take out an annual license and give a bond in security. They must use such forms in their dealings with the farmers as the Act prescribes, and they are under the control of the board.

The administration of the Act is in the hands of the Board of Grain Commissioners, and the board has a number of inspectors whose whole time is given to inspecting the elevators, interviewing farmers, hearing complaints and reporting to the board.

Dissatisfaction and Co-operation.—The farmers did not, however, merely agitate for legislation; they set about helping themselves.

They organized an association called "The Grain Growers' Association." This association, in addition to carrying on campaigns for legislation, created an agency for selling grain called "The Grain Growers' Grain Company." This company has made a remarkable success, and is now the greatest commission firm in Winnipeg. It has bought or built some country elevators, and it has taken up the business of terminal storage, operating elevators "B" and "E" leased from the Canadian Pacific Railway Company at Fort William.

In addition to this, the farmers at several points organized co-operative companies to operate elevators. A few of these companies were successful, and though many were not the principle of co-operation was fostered. In 1911 the farmers of Saskatchewan organized a provincial co-operative company with the aid of the Provincial Government. This company is already operating about 200 elevators, and now largely controls the whole situation so far as initial elevators in Saskatchewan are concerned. In 1913, Alberta adopted a substantially similar system. Experience has already shown that the farmers of the west can successfully operate their own country elevators, and it gives no ground for believing that they cannot build up an organization of their own which will enable them to take the grain from the farm and place it in the hands of the miller or exporter.

Farmer hauling grain to elevator. Fig. 4.

CHAPTER 2.

THE INSPECTION OF GRAIN IN WESTERN CANADA.

Differences in the Value of Grain. Many causes may injure wheat for milling purposes:

1. It may contain mixtures of other cereals, or of various seeds; of barley, oats and flax, of cactus, chess, cockle, darnel, garlic, wild mustard, wild oats, pigweed, ragweed, stinkweed, etc., etc. None of these mixtures are desired by the miller of flour, whatever value they may have for other purposes. An important part of inspection, therefore, relates to admixtures, usually called setting the dockage.

2. It may be free from admixtures, but still be unfit for milling, either because it is affected by diseases such as smut; or because it contains too large a percentage of moisture, which renders it tough, damp, or wet; or because it is dirty or musty; or because it is heating or binburnt. A second important part of inspecting relates accordingly to what is called the condition of the grain.

3. It may be free from all the above and still vary in value for milling purposes. There are many varieties of wheat, differing in their yield of flour both as to quality and quantity. Wheat grown as hard spring wheat may contain too large a percentage of other varieties to be graded high. And when this is not the case, different lots of hard spring wheat may vary in weight per bushel, in colour, in plumpness, and those qualities which are best for the production of high class flour. The supreme test of wheat is its milling and baking value, and, judged by this test wheat as delivered by the farmer shows many and wide variations. The resulting classes are called "grades," and similarly there are grades of oats, barley and flax.

The Grades of Grain. *The Canada Grain Act* divides grain into five general classes, which it names: "No grade," "condemned," "rejected," "commercial grade," and "statutory grade."

"No grade" means all good grain that has an excessive moisture, being tough, damp or wet, or otherwise unfit for warehousing.

"Condemned grain" means all grain that is in a heating condition or is badly binburnt, whatever grade it might otherwise be.

"Rejected grain" means all grain that is unsound, musty, dirty, smutty or sprouted, or that contains a large admixture of other kinds of grain, seeds or wild oats, or from any other cause is unfit to be classed under any of the recognized grades.

"Commercial grade" means grain which, because of climatic or other conditions, cannot be included in the grades provided for in the Act. More

particularly it means that the grain of one year may vary from that of the preceding year, and that a proportion of it therefore cannot be dealt with under the grades laid down in the Act, and must be provided for by grades defined by the Standards Board.

"Statutory grades" means grain of the highest grades which are defined by Parliament, embodied in the Grain Act, and do not vary with the crop. There are four of these grades for Manitoba spring wheat, three each for Alberta Red and White winter wheat, and two for Alberta Mixed winter wheat. In the same way there are statutory definitions of the highest grades of oats, barley, rye and flaxseed. Thus the statutory definitions can only be changed by Parliament. They do not vary with the crop, but are constant. The commercial grades, on the other hand, are fixed by the Standards Board, and may vary from year to year.

Where Grain is Inspected. Grain grown in the west and shipped east is first inspected at Winnipeg, and then at the terminal points, Fort William and Port Arthur. The methods of inspection and the relation between the inspection at Winnipeg and the terminal point are dealt with in detail below.

The Number of Grades. Parliament has defined four grades of western spring wheat:—

One Hard,
No. 1 Northern,
No. 2 Northern, and
No. 3 Northern.

The Standards Board has also defined three grades:

No. 4 Northern,
No. 5 Northern, and
No. 6 Northern.

But wheat of any of the six grades of Northern may fall under the general categories of "no grade," "condemned," or "rejected." During the present season, for example, there are five divisions of No. 1 Northern:

No. 1 Northern,
No. 1 Northern Damp,
No. 1 Northern Smutty,
No. 1 Northern-Rejected on account of seeds,
No. 1 Northern-Rejected on account of heat.

The subdivision applies also to each of the Nos. 2, 3, 4, 5 and 6. This gives no fewer than thirty-one grades of western spring wheat alone, and in the same way there are thirty grades of western winter wheat, thirty grades of oats, fifteen of barley and fifteen of flax.

Importance of the Grades. The grain is stored in the terminal elevators in accordance with the grades; grain of the same grade being binned together.

Bulk storage by grades undoubtedly cheapens the cost of handling. The volume of grain produced in Western Canada is such that to keep separate every lot would be a practical impossibility. But the grain is not only stored by grade, it is also sold wholly by grade. In this respect Western Canada is unique. *The Canada Grain Act* theoretically permits, but really prohibits, the buying and selling of grain except upon certificates of grade, for while a man may sell on sample, the Act refuses those storage facilities which sample trading requires. The grade, therefore, is not merely the basis of storing, it is also the basis of trading the grain. If, therefore, a mistake is made in the inspection it may mean a serious loss to somebody. And if there is any defect whatever in the grading system, any defect either in the definitions of the grades, or the method of applying them, there will be a grave injustice done to some and probably many, and a great gain handed to others. To have the grades right, and to have the inspecting well done, is important in any country where grain is graded; and it is imperative in that country in which alone the grain must be bought and sold on certificate.

The Grain Inspectors. The inspectors of the grain of Western Canada have no easy or unimportant task. They stand between two opposing interests, farmers and millers, the former complaining of undue severity and the latter of culpable leniency. Upon their flank is a third army of critics, the dealers, who consider the grading severe or lenient according as they themselves are sellers or buyers. They have to inspect an enormous volume of grain per car unit, and in certain seasons they must work rapidly and continuously during daylight. They must never be bewildered, either by the variety or continuity in which nature revels, or by the multiplicity of grades of which the terms are neither very distinct nor unambiguous. They have few mechanical aids. Their senses must always be keen, and their judgment always sound, for one error will be remembered against years of efficient service. Their work is of supreme importance, for their verdict fixes which rate per bushel, out of several quoted on the market, the seller will receive, and the grain is stored, transported, and sold both at home and abroad on their certificate.

While not under the Civil Service Commission the grain staff is administered on a Civil Service basis. No one can be appointed as inspector or deputy inspector without passing examinations conducted by a Board of Examiners with the aid of the Chief Inspector of the Dominion. The examiners are experienced grain men, men of integrity, ability and standing, and men who, though wealthy, are willing to render their service in the interest of the grain industry.

The examinations are conducted annually, and they are thorough practical tests of ability to grade. Usually, though not always, the candidates are men who have been working as samplers, track foremen, weighmen, etc., and usually not more than fifty per cent of the candidates succeed in passing. After passing the examination the candidate is appointed on the recommendation of the Chief Inspector. Neither in the examination, the recommendation, nor the appointment have political considerations any place, and this applies throughout the

service. The Western Division runs from the Great Lakes to the Pacific, and the Eastern Division from the Great Lakes to the Atlantic, but the law and the practice are the same in both. As the varieties of grain grown in the west are different from those grown in the east, the inspectors of the one division have nothing to do with the grain grown in the other division, the Chief Inspector alone has jurisdiction in both (fig. 5).

Reinspection.—If the owner of the grain, or his representative, is dissatisfied with the grade given by the Winnipeg inspector he can call for a reinspection. The grain is then reinspected free of charge by the inspector or the Chief Inspector. If the parties interested are still dissatisfied they can appeal to the Survey Board.

Survey Boards.—In each inspection division there are two Survey Boards. In the Western there are the Calgary and Winnipeg Boards, and in the Eastern there are the Toronto and Montreal Boards. West-grown grain can only be surveyed by the Western Boards, by the Calgary Board if the grain goes west of Calgary, and by the Winnipeg Board if the grain goes east, south or north. East-grown grain can only be surveyed by the Eastern Board. Western grain, for example, received at Toronto or Montreal, cannot be surveyed by the Eastern Boards; the sample for the survey must be sent to Winnipeg.

The Survey Boards are all appointed in the same way, and all exercise the same functions. The members are recommended in the Western Division by the Boards of Trade of Calgary and Winnipeg and the Ministers of Agriculture of the three grain-growing provinces, and in the Eastern Division by the Boards of Trade of Toronto and Montreal, and they are all appointed by the Board of Grain Commissioners. The rules and regulations of the Survey Boards are made by the Grain Commission. If the identity of the grain in dispute has been lost, no appeal can be made. If the inspector's grade is confirmed, the owner of the grain pays for the survey, otherwise he does not. The verdict of the Survey Board is final. Once created, a Survey Board is independent during its period, and in appeals its decision is supreme.

Inspection at Winnipeg.—The grading of the grain cannot be easily done in the railway yards. Uniformity is essential to good grading, and if different inspection offices were placed in the different railway yards, uniformity could not be so well maintained. Further, such offices would be far from the place where the grain is bought and sold. Shippers and buyers of the grain require to be in close touch with the inspection office. The actual grading, therefore, and the issuing of the certificates are done in offices rented by the Government in the building of the Grain Exchange. Samples are taken from the car. The other details necessary for the issuing of the certificates are collected in the yards, and both the samples and the details are taken to the inspection office in the Grain Exchange. Fig. 6 gives a view of the Canadian Pacific Railway yard in Winnipeg during the busy time.

G. Serls, Chief Inspector for the Dominion.

Fig. 5.

G. Serls, Chief Inspector for the Dominion.

Fig. 5.

View of Canadian Pacific Railway yards in the busy season at Winnipeg.

Fig 6.

As the grade is given by the inspector upon the samples presented to him, and as he does not see the car from which the sample has been taken, it is essential that a fair average sample be secured. Further, as the length of time between harvesting and the close of navigation on the Great Lakes is only about seventy days, no obstacle must be put in the way of the rapid transportation of the crop. The trains reach Winnipeg every day in the week, and every hour of the twenty-four. Sampling is done, therefore, by night as well as day, and on Sundays as well as other days.

The samplers work together in gangs in shifts of eight hours. They work in gangs because team play is more efficient than solitary effort. Usually the gang consists of fourteen men, four of whom are track foremen, eight are samplers, one is a car opener and one a car sealer.

Fig. 7 shows a gang ready to start, consisting of samplers with their probes, track foremen, a car opener, a car sealer and a clerk. The track foremen are responsible for the efficiency of the work, each foreman usually looking after two samplers.

On the arrival of the train the conductor leaves the car bills in the railway company's yard office. The train clerk of the inspection department makes a list of these bills, showing the car numbers, the name of the shipper, the shipping station, the destination, and the name of the person or company to whom the car is billed. These details are necessary for the issuing of the certificates. He takes this list to the yard office of the inspection department, and hands it to the clerk there. This clerk is also a Government employee, and his work is to prepare the sheets needed in the inspection office (fig. 8). These sheets are two in number, a larger and a smaller. The larger sheet shows all the details mentioned, and the smaller, a carbon copy, only shows the car number and a column for the grade. Both these sheets are sent to the inspection office with the corresponding samples, but the larger sheet with all the details is given to the clerical staff who issue the certificates, while only the smaller sheet is given to the inspectors who grade the grain. In this way all knowledge of the ownership of the grain is kept from the man who grades it. He does not know whose grain he is grading; his information is limited to the number of the car.

When the train is ready the work begins immediately. A train consists of about forty-five cars, and the gang should finish with it in less than one hour. The car opener leads off, opening the car doors, and placing an empty sample bag in each car. These bags are well cleaned beforehand, so that no foreign matter shall be mixed in the sample (fig. 9).

The sampler mounts the ladder, enters the car on top of the grain, and drives his probe into the grain several times and at several points. He empties the grain each time out of the probe on to a cloth laid on the grain near the car door (fig. 10).

The space between the grain and the roof of the car is not deep. A line, called the load line, marked on the inside of the car shows how deep the car should be loaded. It sometimes happens that a car is loaded so full that a fair sample cannot be taken. In such cases the fact of the overloading is put on the

A gang ready to start. Fig 7

The yard office clerk writing his sheets. Fig 8.

Cleaning the sample bags

Fig 9.

Probing the grain, showing the samples with his probe on top of the grain, the track foreman upon a ladder leaning over the door of the car, the cloth on which the grain is emptied, and the sample ticket Fig. 10

ticket by the sign "I.H.," which means "hold for inspection." Such cars are provisionally inspected at Winnipeg. The car numbers are sent to Fort William with instructions to inspect while being unloaded.

Less frequently cars are "plugged," loaded, that is to say, with intent to get some low grade grain past the inspector by concealing it somewhere in the car. The sampler may discover the fraud, and if he does not the inspector at the terminal point usually does. Plugging is a losing game for the shipper, for the whole car is graded according to the quality of the worst grain found in it.

If the car is divided by partitions, a sample is taken out of each partition, otherwise the unit of quantity for sampling is the car.

The track foreman mounts the ladder, leans over the car door, watches the probing, mixes up the sample so as to secure an average, puts it into the sample bag, writes the sample ticket, inserts the ticket in the sample bag, and on descending hangs the bag on the car door (fig. 11).

His name is stamped on the back of the ticket, and on the face he writes the car number, the date, the load line, the initials of the sampler, and any other notations necessary, e.g., leakages, etc. Should any questions arise later about the sample, the ticket shows who did the work, the notations made at the time, and the name of the foreman responsible.

When the sampling is finished the bags are collected (fig. 12), counted, and taken to the Government office in the yard. The numbers on the sample tickets are checked with those on the track sheet by the car office clerk (fig. 13), and both the samples and the sheets are sent immediately to the inspection office.

The car sealer follows the samplers, closing and sealing the doors. Every car is sealed at the shipping point by the railway agent. The object of sealing is, of course, to protect the grain on the way. At Winnipeg only one door of the car is opened, and therefore only one seal is broken. The car sealer reseals that door, and the seals are not touched again until the car is placed at the elevator to be unlocked (fig. 11).

When the samples reach the office they are set out on the tables according to number, those ending in 0-2-4, etc., being put together. Each inspector then takes his sheet, the small one prepared by the car office clerk, and picks out the samples the numbers of which correspond with the numbers on his sheet, and he places them in large boxes in rotation as they appear on the sheets.

The inspection proper then begins. As good light is essential to grading, the inspection begins at 9 a.m. and ends at 3 p.m. The north light being the best, each inspector does his grading at a north window (fig. 15). The actual grading can only be done by one legally qualified and appointed either as deputy inspector or inspector. Inspection turns mainly on three points: the quality of the grain, the condition, and the admixtures. The quality depends on soundness, colour, weight and the percentage of hard wheat. The condition depends upon moisture content (which in doubtful cases is tested mechanically), heat, etc. The admixtures are tested by a process of sieving and weighing called setting the dockage. In this process either the cleaned grain or the resulting screenings can be weighed. Both methods are permissible and both give accuracy. At

Probing the grain, showing the sampler with his feet on top of the grain, the track foreman upon a ladder leaning over the door of the car, the cloth on which the grain is emptied, and the sample ticket

Fig. 10

Emptying the grain upon the cloth

Fig. 11.

Emptying the grain upon the cloth

Fig. 11

Collecting the Samples

Fig. 12

Checking the sample numbers with the train lists in the yard office. Fig. 13.

Sealing ... cars after the samples have been taken. The samples are shown hanging on each car. Fig. 14.

The inspectors at work in Winnipeg

Fig. 15.

Winnipeg the screenings are weighed, while at Fort William the cleaned grain is weighed.

Fig. 16 shows one man testing the weight per imperial bushel, and another sieving for dockage, and fig. 17 shows the moisture testing.

When the grading is finished the samples are put into tins with the sample tickets and placed systematically in shelves. They are kept so long as it is considered possible that they may be required, and then they are sold.

The inspector's sheets are handed over to the clerical staff, and the records are made, and the certificates of grade issued.

Fig. 15. The inspectors at work in Winnipeg

Inspection into the Terminal Elevators. Up till the present the main inspection points in the Western Division have been Calgary, for grain going west of that city, Duluth for bonded grain going south, Winnipeg for all east-going grain, and Fort William and Port Arthur for grain going out of the terminal elevators.

All east-going grain passing through Winnipeg is inspected in Winnipeg. The cars are sampled there, the grain is inspected there, and the Winnipeg Inspection Office is the headquarters of the inspection. The prime object of grading is to classify the grain for bulk storage in the terminal elevators. The individual lot is merged in the bin containing grain of the same grade, and bulk storing by grade lessens the cost. As the storage is at Fort William, the inspection at Winnipeg facilitates the unloading of the cars and the work of transportation. Were the grain inspected at Fort William and not at Winnipeg, the cars would have to be held pending not only the sampling, inspecting and issuing of certificates, but also possible demands for reinspection and appeals. By inspecting at Winnipeg, time is given for all these, and also for the sale of the grain by the time the cars reach the elevators.

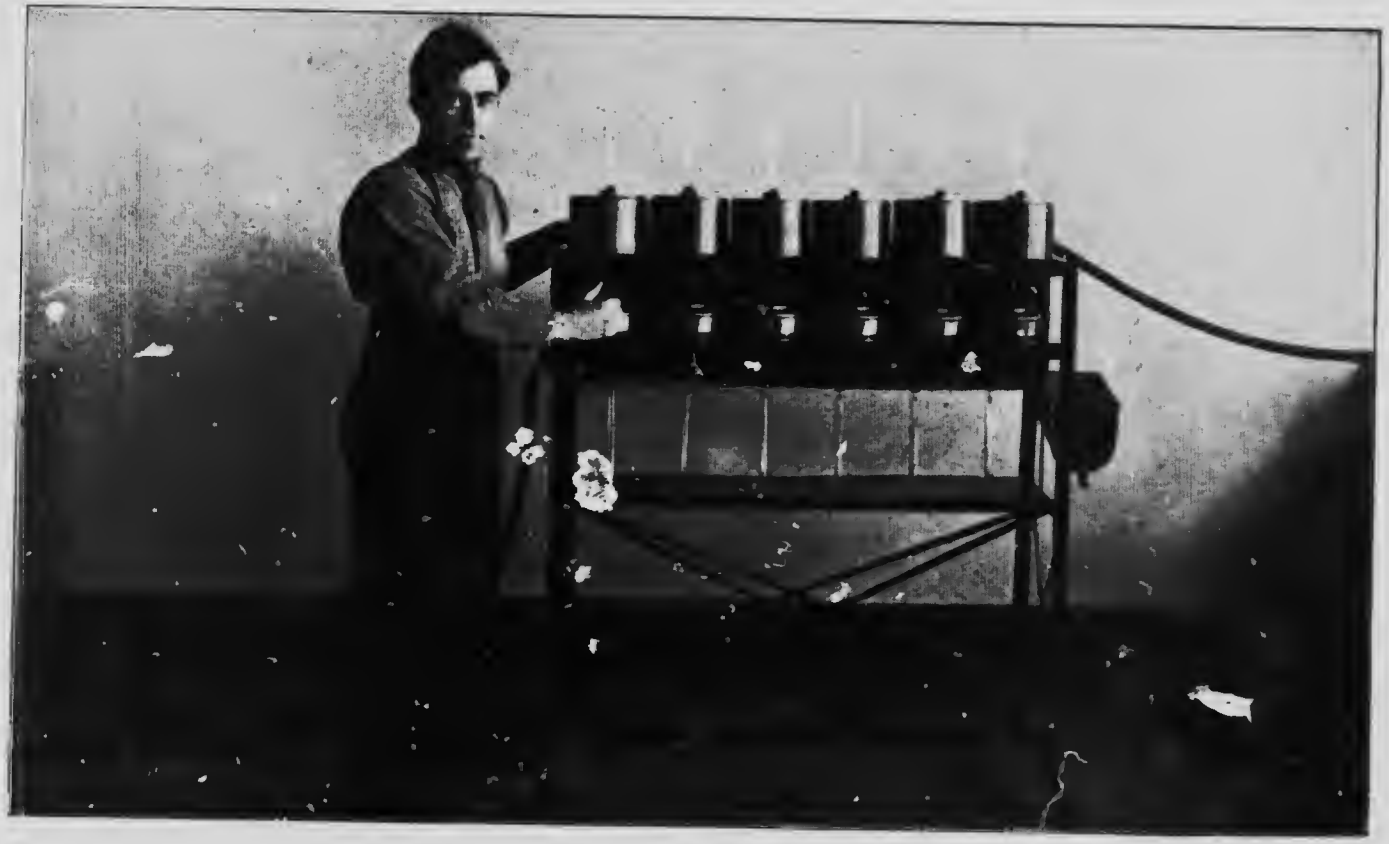
The Winnipeg inspection governs the storage in the elevators, except in cases of cars loaded too full for proper sampling at Winnipeg, cars that have been plugged, cars that have gone out of condition, or cars upon which reinspection has been asked, or an appeal to the Survey Board from the verdict of the inspector demanded.

If a reinspection is asked, it is given at Fort William without any additional charge. If an appeal is made to the Survey Board, the car is resampled at Fort William, and the survey is held on either the Winnipeg or the Fort William sample.

The inspection office at Winnipeg sends, every evening, by express train to the office at Fort William a sheet showing the car numbers, the grade and dockage, the inspector's notations, the shipping point, the destination, the party to whom the car is billed, and the number of the inspector's certificate. As trains are broken up at Winnipeg, or between Winnipeg and Fort William, a new train sheet has to be made at Fort William. This sheet is made from the car bills and from the Winnipeg sheet, and it shows the Winnipeg sheet number, the car number, the grade and notations, the elevator to which the car is sent and the shipping point.

Weighing the grain for test weight per bushel and setting the dockage

Fig. 16.



Testing the Moisture Contents. Fig 17

Nailing the grade ticket upon the car.

Fig. 18.

A grade ticket is then made out for each car and nailed to the car (fig. 18). The grain is stored in the elevator according to the grade shown on the ticket, unless the car has to be reinspected.

The cars are then switched to the different elevators, a man being placed to note signs of leaks or damage caused by the switching.

Fig. 19 shows a car being unloaded. Inside is a shoveller holding his shovel, outside is a man manipulating the shovel by cables, and an inspector is taking a sample of the grain.

Cars that have been held for inspection, or upon which a reinspection or survey has been asked, or that have gone out of condition, or have been plugged, are all sampled and inspected while being unloaded. As a rule, except in these cases, the grade given at Winnipeg remains.

A daily report of all cars unloaded at each elevator is then made. The report shows the carrying company, the car number, the date, the Winnipeg sheet number, the Fort William sheet number, the grade, the dockage, the seal record, the condition of the car (damages, leaks, bulkheads, etc.), the load line, the inspector's notations as to grading, cleaning, etc., and the weighman's notation. One copy of this report is given to the elevator, one is sent to the Chief Inspector, and one is retained in the inspection office at Fort William. The grain is then taken into store, and binned with other grain of the same grade.

Inspection out of the Terminal Elevators.—Grading the grain as it is being loaded out of the elevators into the lake steamers presents some difficulties not experienced in Winnipeg. It is easier to secure a fair average sample of the grain in a standing car, than to secure one out of a mass of grain rushing in several streams from a huge elevator into a steamer. Further, the car sample in Winnipeg is graded in the central office and not in the railway yard, but grain being loaded into a steamer must be graded there and then. To sample the grain, send the sample to a central office and grade it there, might mean that the wrong grain would be loaded into the vessel, and the steamer started off with grain different from that called for by the shipper. To unload grain out of a vessel at Fort William would be difficult, as there are no marine legs, and to delay the steamer would add to the cost. The grain must be graded as it runs from bin to boat.

An inspector with assistants is placed in charge of each elevator, and he is held responsible for the grading out. The grain is sampled at three places, in the tunnels as the grain runs from the storage bins to the working house, on the floor of the working house, and on the steamer as it pours from the shipping bin to the hold. Fig. 20 shows how sampling is done in the tunnel, and fig. 21 shows how it is done on the steamer.

If any grain is seen at any of these places which is not up to the required grade, the stream is stopped instantly. While the grade is given by the inspector in charge of the elevator, all the three samples are sent to the inspection office in Fort William and examined there. In this way the grading by the inspector

Unloading a car of grain. The figure shows a shoveler with shovel in the car and an inspector taking a sample of grain Fig. 19.

Taking a sample from a belt in a tunnel of the Dominion Government Terminal Elevator

Fig. 30.

in the elevator is checked by the grading of the inspector who has charge of all the inspection at the terminal points, Mr. Symes (fig. 22). A sample of every cargo with the Fort William inspection is also sent to the Chief Inspector in Winnipeg.

NUMBER OF CARS OF GRAIN INSPECTED IN WINNIPEG FROM 1900 TILL 1913.

	Cars
1900	32,575
1900-1	15,405
1901-2	57,500
1902-3	54,995
1903-4	40,299
1904-5	40,396
1905-6	69,178
1906-7	81,506
1907-8	63,972
1908-9	87,957
1909-10	114,997
1910-11	100,737
1911-12	176,201
1912-13	189,075

Taking a sample on a steamer loading at the Dominion Government Terminal Elevator

Fig 21

The Inspector in charge of Terminal Elevators—Mr. Symes

Fig. 22

CHAPTER 3.

WEIGHING GRAIN IN WESTERN CANADA.

Accurate weights are as important to shippers of grain as accurate grades. As the grading gives the price per bushel the shipper receives for his grain, so the weighing fixes the total amount. It must be admitted, however, that Canada has been more successful in regard to grading than in regard to weighing.

It is true that weighing grain appears to be a much easier matter than grading it. To read the weight on a scale is simple compared with estimating the quality, condition and admixtures of grain. The one appears to be a purely mechanical process that can be done by any one who is able to read, the other requires accurate observation, expert knowledge and sound judgment.

This, however, is not a fair statement of the case. In fact, the successful organization of a weighing department in Western Canada is a much more difficult task under the conditions than is presented by inspection.

1. Grain is received into about 2,500 country elevators, and it is weighed in every elevator. Inspection, on the other hand, is concentrated at a few strategic points.

2. The men who weigh the grain in the elevators are employees of the elevator companies. The men who grade the grain on the other hand are employees of the state. This is a radical difference between the two. In weighing, one of the interested parties does the actual work, in grading, neither does it. In the terminal elevators there is present an employee of the state to supervise the other weighman, but even this is radically different from the method of inspection.

3. The grain is weighed, as a rule, after it goes into the elevator, while it is graded before it goes in. Further, if the grade given by the inspector is challenged, there is an opportunity for reinspection and appeal, but if the weight given be challenged, there is rarely, if ever, such an opportunity. A lot stored by itself separately could be reweighed, if there has been no leakage between the receiving pit and the scale, or between the scale and the bin, but in all other cases, and these are the majority, the grain is binned with other grain, and it cannot be reweighed.

These differences between "weighing" and "grading" as actually carried on are fundamental, but they are not the only difficulties in the way of a satisfactory weighing department.

The scales in the country elevators are approved and inspected by the Inland Revenue Department, and this work of systematic scale inspection is very difficult. There are so many elevators that the Department of Inland Revenue would do well if it managed to secure one good inspection of each scale per annum. But one inspection is totally inadequate to the needs of the work. A

Mr White, Chief Weighmaster.

scale may be very easily and readily put out of order, and there may occur some condition in the elevator that would render the weight unjust, even though the scale were right. Further difficulties arise from the possibility of car damage and leakage of pilfering, and of variations between the scales, both of which have been inspected and approved.

Weighing at Country Elevators. As stated above, the scales are inspected by the Inland Revenue Department and the actual weighing is done by the operator of the elevator.

The Canada Grain Act, however, has some sections framed with the object of protecting the shipper. Section 158 provides that "persons interested in the weighing of grain at any country elevator shall have free access to the scales while such grain is being weighed." The shipper, therefore, can supervise the weighing if he chooses to do so. Again, the Act provides a penalty for falsifying or misstating the weights (section 240), and in section 175 it provides for an investigation by the Board of Grain Commissioners.

Investigating the weight of a lot of grain after the grain has been stored with other grain, or has left the elevator altogether, is, however, a most unsatisfactory affair.

Weighing at the Terminal Elevators. While there are state weighmen at some other points (mills and public elevators), it is at the terminal elevators that the state has done most in the matter of weighing; the weighing department has its headquarters there, and official certificates of weight are given there.

The Chief Weighmaster (fig. 231) has charge of all the weighing, under the Board of Grain Commissioners. His authority in matters pertaining to weighing is similar to that of the Chief Inspector in matters pertaining to grading.

By an arrangement made by the Ministers of the two Departments concerned, the Chief Weighmaster is also the scale inspector at the terminal point. In this way, he has authority both as regards the scales and the weighing. The conditions for accurate weighing are, therefore, better at the terminal than at other elevators. The scales are larger and more frequently examined. The elevators are also more frequently examined for leakages, etc. The records are better kept, and the actual weighing, though done by an employee of the company, is supervised by an employee of the state.

When a car reaches the elevator siding, it is examined for defects or leakages, and a record is kept if such are found, of the car number and the condition. A seal record is also taken (fig. 24). The depth of the grain in the car is measured and recorded (fig. 25), and the load line noted. The grain is then unloaded, elevated to the hopper above the scale, and weighed by the company's weighman under the observation of the Government weighman (fig. 26). A draft ticket showing the amount weighed is punched by the scale register. A record of the weight is taken, and upon this the certificate of weight is issued (fig. 27).

Recording the seal numbers.

Fig. 24.

Measuring the depth of grain in the car.

Fig. 25

Weighing the Grain. Fig. 25.

The Clerical Staff, Fort William.

Fig. 27.

CHAPTER 4.

TERMINAL ELEVATORS.

The Lake Terminals. The terminal elevators have up to the present been all built at Fort William and Port Arthur. They are called "terminal," not because they are situated on lake Superior, or because they have been built at the lake terminal yards of the railway lines, but because the inspection of western grain ends at them. The grade given as it leaves the elevators at these points is the final grade, the grade on which it is sold and delivered, both in Eastern Canada and the foreign markets. Eastern inspectors have nothing to do with the grading of western grain—they are restricted to the eastern product. In the Winnipeg Grain Exchange contracts are made on the basis of delivery at Fort William and Port Arthur, and as in the trading so in the grading. The point of delivery, and the point of final inspection, are at the large elevators at these points.

And these points are well fitted to be terminal points. They are the points at which the railway lines and the lake steamers can most easily meet. They are, therefore, and will remain the chief transportation arteries between East and West. It is sometimes said that Canada has pursued a mistaken policy in building the large terminal elevators at the head of the lakes, and that she should build them rather at the Atlantic ports. This view forgets two most important conditions, that of inspection, and that of alternative markets and routes. It would be very difficult and expensive to have the inspection and delivery at the Atlantic seaports, and to store grain at these ports pending sale would limit the seller to European markets. Inspection of western grain can be done more efficiently and more economically at Fort William and Port Arthur, and grain stored there can be sold either in Eastern Canada, the United States or Europe, and be shipped through either Canadian or United States channels.

Fort William and Port Arthur are well situated for both purposes. Hence the terminal elevators for east-going grain have been built there. And these elevators have grown both in number and capacity with the trade.

The following is a list of them:—

FORT WILLIAM.

	Bushels.
The Grand Trunk Pacific Elevator, capacity.....	6,400,000
The Western " "	1,000,000
The Consolidated " "	1,750,000
The Fort William " "	1,750,000
The Ogilvie " "	1,100,000
The Canadian Pacific "D" " "	7,350,000
The Grain Growers " "	2,500,000
The Eastern " "	2,235,000
The Empire " "	1,750,000

PORT ARTHUR.

	Bushels.
The Dominion Government Elevator, capacity.....	3,250,000
The Port Arthur " "	9,500,000
The Horn and Co. " "	750,000
The Thunder Bay " "	1,500,000
Total capacity.....	40,435,000

Legislation Affecting Terminal Elevators.—The terminal elevators handle a large percentage of the total grain sold. Their operation affects every grain interest in the country, farmers, dealers and millers. They have accordingly been subjected to keen scrutiny, fierce criticism and detailed legislation, and that in regard to almost every phase of their operations. Complaints have been directed against them as regards the trustworthiness of those operating them; tariffs and charges; grades and weights; their methods of storing, binning and shipping; cleaning and drying; loaning and mixing; and their accumulation of surpluses. And the legislation governing them has been designed with explicit reference to these complaints. It may be summarized as follows: –

1. Licenses, Bonds and Insurance.—Persons proposing to own, lease, manage or operate terminal elevators must secure the approval of the Board of Grain Commissioners. Further, the elevators are licensed annually, and the Board can recommend the revocation of the license in case of proven violations of the law. Each licensee must file with the Board a bond to His Majesty conditioned for the faithful performance of his duties as a terminal warehouseman, and his full and unrestricted compliance with all laws in relation thereto. And every terminal warehouseman must insure the stored grain against fire in companies satisfactory to the Board.

2. Elevator Tariffs and Charges.—All charges for storing, cleaning, handling and the insuring of grain, including the cost of receiving and delivering are subject to such regulations or reductions as the Board deems proper. The charges are fixed annually. During the first week of September the companies file with the Board the rates they propose to charge during the following year, and the Board holds a public session for the purpose of hearing objections to the proposed rates.

3. Grades and Weights.—As set forth above the grading of the grain both into and out of the terminal elevators is done under the supervision of the state.

4. Receiving, Storing and Shipping.—*The Canada Grain Act* lays down certain provisions governing the receiving, storing and shipping of the grain, and the inspectors and officers of the Government in the elevators see that the law is conformed with.

5. Cleaning, Drying, etc.– The inspectors define what percentage of admixture should be cleaned out of the grain as received, and the actual cleaning is

under their supervision. *The Canada Grain Act* provides for the compensation to be paid, if any, to the owner of the grain for the screenings.

6. Registration and Cancellation of Warehouse Receipts. When grain is received into store, a warehouse receipt is issued for it to the party delivering the grain. This receipt states the place, the date, the shipping point, the name of the owner, the kind and grade of the grain, the net weight and the car number.

This receipt is sent to the registration office of the Board of Grain Commissioners. It is then compared with the inspector's report of the cars unloaded at the elevator in question, and if found correct it is registered. On the receipt of the bill of lading the receipt is given to the owner of the grain. The receipt is then negotiable on the market, and it can also be used as collateral security for a loan from the bank.

When grain is loaded out of the elevator, the receipt representing it must be presented to the registration office for cancellation within seventy-two hours, exclusive of holidays, of the loading of the grain.

It is obvious that the registration records show the total quantities of the various grains by grades received into and shipped out of the elevator. The inspection and weighing departments also possess such records, so that a complete check is secured.

7. Annual Stocktaking.—In the month of August, every year, officers of the Board of Grain Commissioners take stock of all the grain in each elevator, and statements are made out showing the kinds, grades and weights of grain in each house. The registration clerks table the receipts issued and cancelled during the year, and the surpluses and shortages in the elevator are determined.

8. The Dominion Government Elevator (Fig. 28).—The erection and operation of a large terminal of the Dominion Government strengthens the control exercised over all the elevators. It gives first-hand knowledge about the cost of construction and operation, and about every phase of the business of the public storage of grain. Farmers can now ship their grain either to an elevator operated by the Government or to one operated by their own company, the Grain Growers' Grain Company, or to one owned by the Canadian Pacific Railway Company, or to any of those operated by commercial companies.

Interior Terminals. The construction of the Panama canal and the Hudson Bay railway have rendered necessary the provision of elevator and inspection facilities for grain shipped by these routes. The value of the new routes is still a matter of question, and can be established only by experience. The freight rates by land and sea, the marine insurance rates, the length of the period of navigation through the Hudson straits, and the effect of the heat upon the condition of the grain shipped in bulk v'a Panama are still uncertain, and this uncertainty renders it difficult to demonstrate how best to provide the inspection and elevator facilities required.

Two methods were possible. One was to build terminal elevators at the Hudson Bay and Pacific coasts, and equip and operate them as the lake terminals are equipped and operated: that is to say, with all facilities for the inspection

The Dominion Government Elevator, Port Arthur.

Fig. 28

and handling of grain. Were this method adopted shippers of grain via the new routes would be able to store grain at the Hudson Bay or Pacific coasts, and upon sale deliver it from the elevators there.

But to store grain at either of those coasts pending sale would put a grave risk upon the shipper. He would be limited to the export market and to one route, and to a route in which unknown, and adverse conditions might be encountered; and the grain could not be easily brought back from either coast and shipped east. Storing grain pending sale on the Atlantic seaboard would involve fewer risks, yet shippers do not store at the Atlantic seaboard but prefer to store it at interior points like Fort William and Port Arthur, because of the larger number of markets open to them from those interior points. To provide inspection and elevator facilities on the Hudson Bay and Pacific coasts would not give either route a fair trial.

The second method has, therefore, been adopted, the method, namely, of erecting at the Hudson Bay and Pacific coasts transfer elevators similar to those at Montreal, Halifax and St. John, and terminal elevators at strategic points in the interior, Calgary, Saskatoon and Moosejaw, similar to the elevators at Fort William and Port Arthur. These five elevators are now being constructed. The elevators at Calgary, Saskatoon and Moosejaw are being equipped with full inspection facilities. These three points, therefore, will be terminal points in the same sense in which Fort William and Port Arthur are terminal points, and the three elevators will be owned and operated by the Dominion Government. Grain stored at these points will be available for shipment via the Panama or Hudson Bay routes should these be more economical. The elevators at the Hudson Bay and Pacific coast will be also operated by the Government, and they will be provided with sufficient storage capacity to handle the grain shipped through them (fig. 29).

The elevators at Calgary, Saskatoon, and Moosejaw will serve other purposes besides providing for these new routes. They will bring the work of inspection somewhat nearer to the grain-growing area. In addition to that, they will provide, for the first time in Western Canada, hospital apparatus upon the grain field. Hitherto grain needing to be dried had to be shipped to Fort William or Port Arthur, and the total lack of drying plants on the grain-growing area has in some years caused an enormous loss. In 1912, for example, there was a very large percentage of the western crop damaged by rain and snow. The damaged grain contained a very high percentage of moisture which could not be extracted until the grain reached Fort William or Port Arthur, and much of it went out of condition before it reached the drying plants there. The amount lost in that one season would have built the three elevators now being erected.

The elevators will also give a certain amount of additional storage capacity which will be useful in periods of congestion. It is not supposed, and it is not intended, that these elevators will take the place of the lake terminal elevators for grain shipped east, or that they will be very much utilized for east-going grain during the period of navigation on the Great Lakes. They are being built partly because of the need of hospital apparatus on the grain growing area,

Design for Dominion Government Elevators at Saskatoon, Moosejaw and Calgary

Fig 21

partly because of the advisability of having some reserve storage for times of emergency, and partly because of the necessity of providing for the Hudson Bay and Panama Canal routes in a way that will give those routes a fair trial. The enormous quantity of grain grown in Western Canada, the difficulty of shipping it all by the eastern route, a difficulty enhanced by the shortness of the period of navigation and the long rail haul from the grain fields to the Atlantic, these conditions have led to the hope, practically universal in the west, that the opening of the Panama canal will be an immense gain to the grain growers of Alberta, and the opening of the Hudson Bay route to grain growers of Saskatchewan. The Government, by the construction of the five elevators named, is doing all that can be done, and more than some consider should be done, to make the new routes successful.

CHAPETR 5.

EASTERN ELEVATORS.

Western grain on the way to mills in Eastern Canada or to the European markets passes through elevators situated in the eastern ports of the Great Lakes or the Atlantic seaboard. These elevators differ from the terminals in function and equipment. They are not primarily either storage elevators or elevators for the cleaning and treating of grain. They are primarily transfer houses, parts of a transportation machinery, equipped to transfer grain already graded and cleaned, from boat to bin, and from bin to car or ocean steamer. And, as western grain is finally inspected at Fort William and Port Arthur, and cannot be inspected again, there is neither an inspection nor a supervising staff maintained in these elevators such as are maintained in the terminals.

The Dominion Government owns three of these elevators, one at Port Colborne, one at Halifax (fig. 30), and one at St. John (fig. 31), and it operates them through the Department of Railways and Canals. Of the others, some are owned and operated by the Harbour Commissioners of Montreal (fig. 32) and Quebec, some by the Canadian Pacific and Grand Trunk Railway Companies, some by warehousing companies that do not trade in grain, and some by companies that deal in grain.

Apart from those operated by the Department of Railways and Canals, these elevators are required to take annual licenses from, and file bonds with, the Board of Grain Commissioners. Their tariffs and charges are under the control of the Board, and they are required to conform with certain sections of the Grain Act in receiving, binning, treating and shipping the grain. The principle of these provisions is that they must maintain the identity of the grade; whatever grade the grain carries as it is received, it must carry as it is delivered. The method of applying this principle is not that of inspection and supervision of the work of the elevators as at Fort William and Port Arthur, but that of tracing the identity of the grade, should the buyer consider that the grain delivered is not up to the grade of the certificate.

Dominion Government Elevator, Halifax, N. S. Fig. 30

Dominion Government Elevator, St. John, N. B. Fig. 31

Harbour Commissioners' Elevator, Montreal. Fig. 32.

CHAPTER 6.

THE BOARD OF GRAIN COMMISSIONERS.

The administration of *The Canada Grain Act* is under the Department of Trade and Commerce of Canada. It is entrusted to the Board of Grain Commissioners, which reports to the Minister of that Department. The Board consists of three members, appointed for ten years, with headquarters at Fort William. The work of the Board falls under three main heads—administrative, commercial, and judicial.

Administrative Work.—1. It has charge of the inspection and weighing of grain. It carries on this work through two executive officers: the Chief Inspector, Mr. Serls, of Winnipeg; and the Chief Weighmaster, Mr. White, of Fort William. Inspection is done at Montreal, Toronto, Peterborough, Kingston, Port Arthur, Fort William, Winnipeg, Calgary, Duluth, and at several of the large western mills. New inspection offices will be opened at Moosejaw, Saskatoon, Vancouver, and the Hudson Bay in connection with the elevators being erected there, and weighing is done at most of the inspection points. It appoints the Standards Boards and the Examining Boards.

2. It has charge of the licensed elevators of the Dominion. It issues the licenses, receives the bonds, fixes the tariffs, watches the insurance of the grain in the terminals, does the work of registration and cancellation of receipts, and maintains a staff of inspectors who regularly visit the country elevators.

3. It has a statistical department at Fort William, in which it collects all statistics relevant to its work.

The administrative work is organized in departments: those of inspection, weighing, registration, statistics, each in charge of an executive officer who is held responsible for this staff. The number of men employed in all these departments varies with the season. During the months September to December, the number goes over three hundred; during the rest of the year it is about two hundred and fifty.

Commercial Work.—It has already built one elevator at Port Arthur, which it operates as a public terminal. The elevator was built and is operated on commercial lines, and in this work the board competes with other terminal companies. The elevator is recognized as one of the best in Canada, and its cost of construction as one of the lowest. The board is constructing elevators at Saskatoon, Moosejaw, Calgary, Hudson Bay, and Vancouver, and it will operate these also. The total capacity of all the board's elevators will be 15,750,000 bushels, and the total number of men employed in the operation will run from one hundred and thirty upwards. For the construction work the board has an engineering staff, the Chief Engineer being Mr. Howe, whose office is at Saskatoon.

Judicial Work.—The board investigates all complaints made about handling grain, complaints about grades, weights or dockage; about prices or charges; about cars, platforms and elevators; and about fraud or oppression by any person, firm or corporation owning or operating any elevator, warehouse, mill or railroad, or by any grain commission merchant or track buyer.

For this work the board can summon witnesses, administer the oath, examine witnesses under oath, and compel the production of all books and documents relating in any way to the matter complained of. It can suspend or dismiss operators, recommend the withdrawal of licenses, institute proceedings at the expense of the Government, and its reports are prima facie evidence in the courts.