

large number of plants. Sometimes this was done by the manufacturers on their own initiative, sometimes under the ægis of the department of trade and commerce, sometimes at the instance of our association. While the movement did not always prove successful, so far as the actual securing of orders was concerned, it was unquestionably the means of bringing some valuable business to Canada, to say nothing of the fact that the mutual confidences inspired by this plan of co-operative selling should pave the way for bigger and better returns in the future.

The serious inconvenience caused by the interruption in the supply of German chemicals, first focused the attention of Canadian manufacturers upon the question of industrial research. A study of the situation by the Canadian section of the Society of Chemical Industry, showed it to be surrounded by so many ramifications, as to make it impossible for them to cover the field unaided, and they accordingly petitioned the government to appoint a commission to investigate the subject from a general standpoint, as indicated by the resources of the country, the necessities of the industries affected and the possibilities of extending the chemical and allied industries of Canada. "Your association," says a report of the Canadian Manufacturers' Association, "was asked to endorse the petition, and with this request your committee gladly complied.

Commercial Museum for Canada.

"Concurrently with this action, your committee arranged for a deputation to wait upon the government in support of the establishment of a commercial museum in Canada, under the auspices of the department of trade and commerce. While the chief function of such a museum would be to inform our manufacturers and merchants as to the potentialities of the expansion of our industry and commerce, it could be made to supplement in a practical way the results obtained from industrial research."

ONE MILLION WEEKLY FOR SHELL MAKING

That is the Wage Bill in Canada for Shell Manufacturing —Fifty Thousand To Be Turned Out Daily

Sixty thousand artisans are employed in Canada, drawing weekly wages of \$1,000,000 in 247 factories, manufacturing shells for the war arena. Orders for 9,000,000 shells have been placed here by the shell committee and for 8,100,000 cartridge cases, fuses, primers, and friction tubes. For these contracts orders have been placed for 170,000 tons of steel, 30,000 tons of lead and several thousand tons of other material. Canada will be shortly turning out 50,000 shells per day.

These facts were given by Colonel Alexander Bertram, chairman of the shell committee appointed by the Dominion Government to superintend the manufacture of munitions of war, in an address to the delegates to the Canadian Manufacturers' Association convention at Toronto last week. Colonel Bertram said:—

"Shortly after the war broke out the minister of militia received an order from the British Government for supplies of arms and ammunition. Contracts were placed for these both in Canada and the United States, and then came the request for 200,000 shrapnel shells, unloaded, in equal numbers of 15 and 18-pounders. Canada possesses in the city of Quebec a modern plant for the manufacture of shells, but its capacity is limited. It can only produce 75 shells per day, which we now see was quite inadequate to meet the demand. There was only one thing to do. The minister of militia conceived the idea of utilizing the engineering factories throughout the Dominion for shell manufacture, and to secure the co-operation of employers and employees in the engineering trades to take up this patriotic work.

Committee to Handle Work.

"A committee was appointed to organize the movement throughout the Dominion. The members of this committee are: Messrs. Thos. Cantley, of New Glasgow; George W. Watts, Toronto; E. Carnegie, Welland; General T. Benson, master general of ordnance; Mr. J. W. Borden, chief ac-

countant and paymaster-general; Col. Harston, and Col. Lafferty, the latter four representing the Department of Militia and Defence. I had the honor to be named chairman.

"As a direct outcome of the work of the shell committee a copper refinery in Canada will be made possible. Our experience in nine months has demonstrated the fact that the development of this industry in the Dominion, while it would undoubtedly benefit every manufacturer who uses copper, is above all things a military necessity. Canada will not have to remain long under the reproach of having to import its refined copper, and I can assure you of this, that within three or four months we expect to be making in this country, from the native product, all the copper bands required in the production of shells.

Financing and Inspecting.

"It was agreed to supply all the component parts of shells free of charge to those manufacturers who would undertake the work of finishing and assembling the complete shells. In this way many of the smaller manufacturers were relieved of the financial burden of carrying a heavy stock of the raw materials, and which very largely contributed to the success of this huge undertaking. It was further decided to eliminate unhealthy competition by paying uniform price for the same article. An inspection company was chosen to deal with all shell components, thus relieving the assembling manufacturers of the responsibility of inspection, while at the same time satisfying the shell committee beyond question that the component parts of shells were correct in every particular before the finished article passed into the hands of the Government inspector.

Shell Orders Placed.

"Starting with the first order for 200,000 shrapnel we have since placed orders aggregating 9,000,000 shells consisting of 15 and 18-pounder shrapnel; 18-pounder, 4.5 and 60-pounder high explosive shells. In addition we have placed orders for 100,000 cartridge cases, 5,000,000 fuses, 2,000,000 primers, and 1,000,000 friction tubes.

In no one single establishment in Canada except the Dominion Arsenal at Quebec, is the complete shell made. One hundred and thirty firms from Halifax to Vancouver are engaged in the work of machining and assembling. Others are occupied in the manufacture of blanks, bullets, discs, cartridge cases, buckshot, primers, tubes, tin cups for shrapnel, grub screws, sockets, and plugs, steel base plates, and boxes. From an enumeration of these various articles it will be observed how extensive the several operations are.

Many Factories Engaged.

"At the present time no less than 247 factories are engaged in this work in 78 cities and towns in the Dominion. In Montreal alone 35 factories are employed. Toronto has 28, Hamilton 17, and so on throughout the Dominion from coast to coast. Practically every province of Canada is participating in this enterprise. The manufacture of shells in this country is giving employment to between 60,000 and 70,000 artisans while the total weekly wage bill easily amounts to \$1,000,000. From these figures you will see what the shell-making industry means to the working men as well as to the manufacturers of the Dominion.

"The changes which were necessary in the equipment of the various factories by adding new machinery, or in the readjustment of existing plants, were made by the manufacturers themselves and at their own expense. These changes gave employment to many other factories which were not directly engaged in making ammunition. In the course of a very short time now we shall be producing from between 40,000 and 50,000 shells per day. For the contracts already placed it may interest you to know that 170,000 tons of steel, about 30,000 tons of lead, and several thousand tons of other materials are required.

Cordite and Powder.

"In addition to the manufacture of several thousand tons of cordite and powder in connection with the present contract, an important new industry has been initiated in the Dominion, viz., the utilization of the by-products from the coke ovens of the Dominion Iron and Steel Company at Sydney, N.S., for the manufacture of the high explosive, trinito-toluene. The revenue alone from the contract placed with this company will be nearly \$5,000,000."