Technical and Bibliographic Notes / Notes techniques et bibliographiques

The Institute has attempted to obtain the best original copy available for filming. Features of this copy which may be bibliographically unique, which may alter any of the images in the reproduction, or which may significantly change the usual method of filming, are checked below.

L'Institut a microfilmé le meilleur exemplaire qu'il lui a été possible de se procurer. Les détails de cet exemplaire qui sont peut-être uniques du point de vue bibliographique, qui peuvent modifier une image reproduite, ou qui peuvent exiger une modification dans la méthode normale de filmage sont indiqués ci-dessous.

- ☐ Coloured covers/ Couverture de couleur
- ☐ Covers damaged/ Couverture endommagée
- ☐ Covers restored and/or laminated/ Couverture restaurée et/ou pelliculée
- ☐ Cover title missing/ Le titre de couverture manque
- ☐ Coloured maps/ Cartes géographiques en couleur
- ☐ Coloured ink (i.e. other than blue or black)/ Encre de couleur (i.e. autre que bleue ou noire)
- ☐ Coloured plates and/or illustrations/ Planches et/ou illustrations en couleur
- ☑ Bound with other material/ Relié avec d'autres documents
- ☑ Tight binding may cause shadows or distortion along interior margin/ La reliure serrée peut causer de l'ombre ou de la distorsion le long de la marge intérieure
- ☐ Blank leaves added during restoration may appear within the text. Whenever possible, these have been omitted from filming/ Il se peut que certaines pages blanches ajoutées lors d'une restauration apparaissent dans le texte, mais, lorsque cela était possible, ces pages n'ont pas été filmées.

- ☐ Coloured pages/ Pages de couleur
- ☐ Pages damaged/ Pages endommagées
- ☐ Pages restored and/or laminated/ Pages restaurées et/ou pelliculées
- ☑ Pages discoloured, stained or foxed/ Pages décolorées, tachetées ou piquées
- ☐ Pages detached/ Pages détachées
- ☑ Show through/ Transparence
- ☑ Quality of print varies/ Qualité inégale de l'impression
- ☐ Continuous pagination/ Pagination continue
- ☐ Includes index(es)/ Comprend un (des) index

Title on header taken from:/ Le titre de l'en-tête provient:

- ☐ Title page of issue/ Page de titre de la livraison
- ☐ Caption of issue/ Titre de départ de la livraison
- ☐ Masthead/ Générique (périodiques) de la livraison

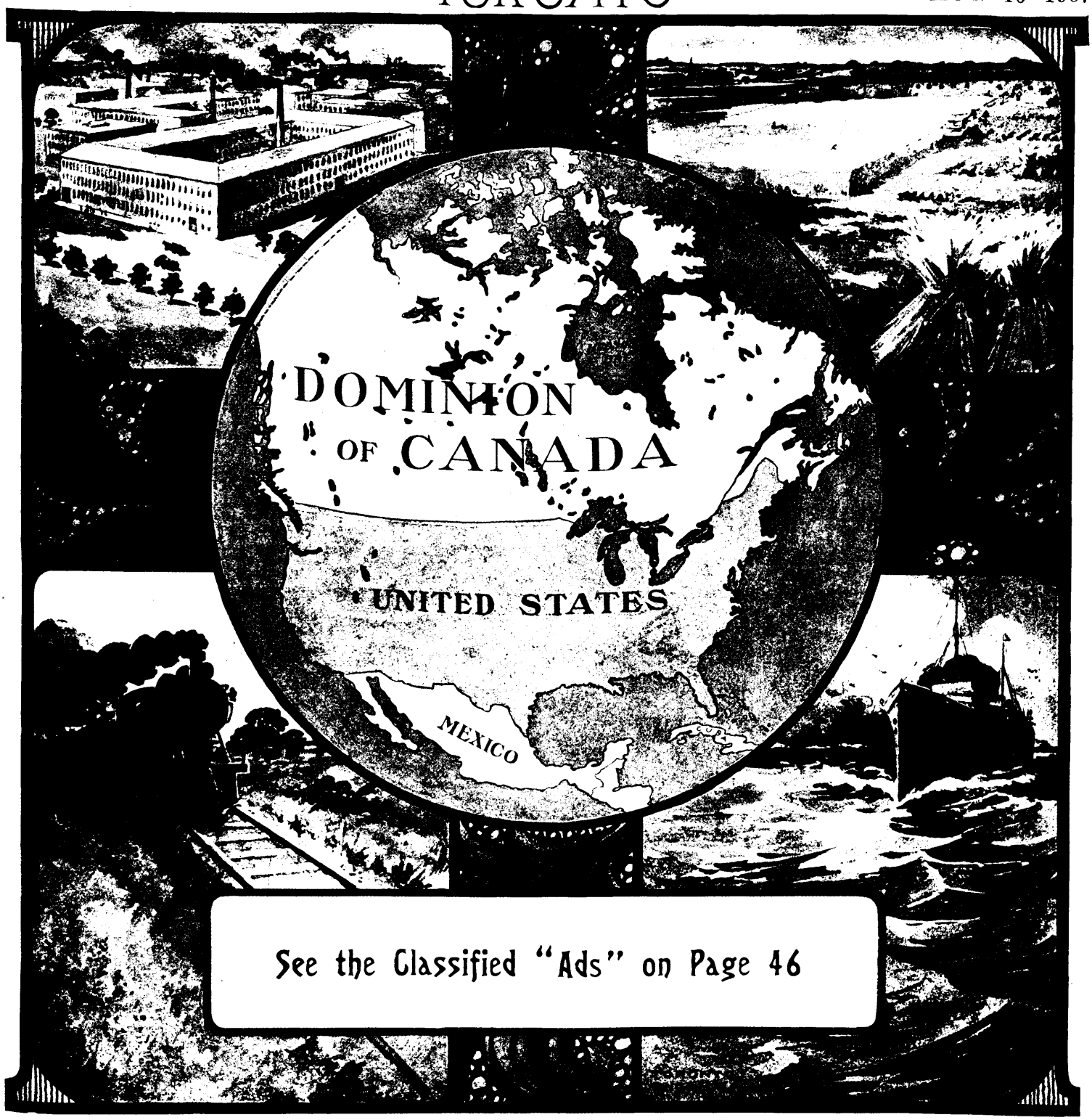
☐ Additional comments:/ Commentaires supplémentaires:

This item is filmed at the reduction ratio checked below/
Ce document est filmé au taux de réduction indiqué ci-dessous.

10X	12X	14X	16X	18X	20X	22X	24X	26X	28X	30X	32X
☐	☐	☐	☐	☐	☐	☐	☐	☐	☑	☐	☐

The CANADIAN MANUFACTURER
AND INDUSTRIAL WORLD.
DEVOTED TO THE MANUFACTURING INTERESTS OF CANADA.

VOL. 55 NO. 4. TORONTO AUG 16 1907



See the Classified "Ads" on Page 46

PROFESSIONAL DIRECTORY

Patent Attorneys, Mechanical and Electrical Engineers, Hydraulic and Constructing Engineers, Chemical and Mining Experts, Contractors and Builders, Architects, Auditors, Accountants, Etc.

CHARLES H. MITCHELL, C.E.

Member Canadian Society Civil Engineers.
Member American Society Civil Engineers.
Assoc. American Inst. Electrical Engineers.

Hydro-Electric Engineer

Rooms 1004-5 Traders Bank Bldg.,
Telephone Main 7390 Toronto

K. L. AITKEN

Consulting Electrical Engineer

1003 Traders Bank Bldg.
TORONTO

Long Distance Phones { Main 1432 / North 3119 / North 1933

DODGE & DAY

ENGINEERS

Mechanical, Electrical, Architectural

PHILADELPHIA, PA.

Layout, Construction and Equipment of Industrial Establishments.

We will send printed matter descriptive of our work on request.

C. J. FENSOM, B.A. Sc.

Consulting Engineer

ABERDEEN CHAMBERS. - TORONTO

Phones { Office. - - M. 1923 / Residence. N. 2967

Machinery Designed, Supervised, Inspected and Contracted for. Tests, Reports, Electric Light Plants, Power Plants, Pumping Plants.

PATENTS PROMPTLY SECURED

We solicit the business of Manufacturers, Engineers and others who realize the advisability of having their Patent business transacted by Experts. Preliminary advice free. Charges moderate. Our Inventor's Adviser sent upon request. Marion & Marion, Reg'd., New York Life Bldg., Montreal; and Washington, D.C., U.S.A.

RODERICK J. PARKE

A.M. Amer. Inst. E.E.
A.M. Can. Soc. C.E.

CONSULTING ENGINEER

James Building, - - TORONTO

Long Distance Telephone.

TO MANUFACTURERS: — Advice and specifications covering Industrial Applications of Electricity—Lighting—Power Transmission—Factory Power Distribution — Steam Plants.

TESTS—REPORTS—VALUATIONS.

CHARLES BRANDEIS

A. M. Can. Soc. C.E.
Mem. Amer. Electro-Chemical Soc., etc.

CONSULTING ENGINEER

Estimates, Plans and Supervision of Hydraulic and Steam-Electric Light, Power and Railroad Plants, Specifications, Reports, Complete Factory Installations, Electric Equipment of Mines and Electro-Chemical Plants.

Long Distance Telephone Main 3256.
62-63 Guardian Building, MONTREAL

ROBERT W. HUNT & CO.

Bureau of Inspection, Tests and Consultation.

66 Broadway, New York: 1121 The Rookery, Chicago; Monongahela Bank Bldg., Pittsburgh; Norfolk House, Cannon St., E.C. London.

Inspection of Rails and Fastenings, Cars, Locomotives, Pipe, etc.; Bridges, Buildings and other Structures. Chemical and Physical Laboratories. Reports and estimates on properties and processes.

PATENTS

TRADE MARKS, Etc.

HANBURY A. BUDDEN

NEW YORK LIFE BUILDING, MONTREAL.

Established 1873. Telephone Main 1889.

THOMAS HEYS & SON

Charles H. Heys, Manager.

CHEMICAL and MINING EXPERTS.

Analyses of all commercial products, etc. Plans and reports on mines and mining locations.

121 Yonge Street, TORONTO, ONT.

Trussed Concrete Steel Company

Manufacturers Reinforcing Steel
Concrete Engineers

23 JORDAN ST., TORONTO

GUSTAVE KAHN, Canadian Manager.

W. H. STOREY & SON, Limited, Acton, Ont.

Manufacturers of.... FINE GLOVES and MITTS

In every variety and style. Moccasins

ANY COLOR OF CRAYON

that you want can be obtained from us. We are specialists for Cotton, Woolen and Worsted Manufacturers. No trouble to send samples.

LOWELL CRAYON CO., - Lowell, Mass.
Original Manufacturers.

A. C. NEFF & CO.,

CHARTERED ACCOUNTANTS

26 Wellington St. East, TORONTO
Phone Main 1880.
Audits and Investigations a Specialty.

MAIN 4834 Expert in Time Saving Devices

HENRI VIAU

Business Methodizer
(Accountant)

Room 14
"La Presse" Building
Office Systems Installed MONTREAL

Rock, Ore, Cement, Clinker, Coal,

PULVERIZERS

The Sonator Mill Manufacturing Co.,
Galt, Ont. Limited

We have Pulverizing Mills in six Portland Cement factories in Ontario and are building 20 Griffin mills for the Bellerille plant of the Lehigh Portland Cement Co. who have 10 factories in the United States using Griffin Mills.

Sprinkler Leakage Insurance

is indemnity paid for losses sustained by the accidental discharge of water from installed Sprinkler Systems.

Are you insured against Sprinkler Leakage Damages?

The
Canadian Casualty and Boiler Insurance Company

TORONTO

Insures Sprinklers, Boilers, Elevators and all Personal and Property Risks.

A. G. C. DINNICK, Managing Director.
Head Offices:
22-24 ADELAIDE ST. E. and 55 VICTORIA ST.
Phone Main 4091

REINFORCED CONCRETE CONSTRUCTIONS

For FIRE-PROOF WAREHOUSES, FACTORIES, POWER PLANTS, BRIDGES, FLUMES, PENSTOCKS, RETAINING WALLS, ETC. . . . .

NO INSURANCE REQUIRED. ECONOMICAL AND PERMANENT MODE OF CONSTRUCTION.

A. & E. LOIGNON, Designing and Contracting Engineers
17 Place d'Armes Hill, MONTREAL

High "NOVO" Speed

Milling Cutters
Twist Drills
Reamers
Drill Rods

Round, Square, and Flat Bars.
Cutter Blanks.
Sq. Cutters for Tool Holders

WILLIAM ABBOTT

334 St. James St. Montreal

CANADIAN MANUFACTURER AND INDUSTRIAL WORLD
DEVOTED TO THE MANUFACTURING INTEREST OF THE DOMINION

ESTABLISHED IN 1880.

PUBLISHED ON THE FIRST AND THIRD FRIDAYS OF EACH MONTH

The Canadian Manufacturer Publishing Co., Limited.

408 McKinnon Building, Toronto.

Also London, Eng., and Philadelphia, Pa.

J. J. CASSIDEY, F. S. KEITH, } Editors.
D. O. McKINNON, - Business Manager.
A. B. FARMER, - - Subscription Representative.

Cable address: "CANAMAN." Western Union Telegraphic Code used.

SUBSCRIPTIONS:

Canada $1.00. United States $1.50 per year. All other Countries in Postal Union six shillings sterling, including postage.

CANADIAN PIG IRON.

The American Iron and Steel Association has received direct from the manufacturers complete statistics of the production of pig iron in Canada in the first six months of 1907.

The total production of all kinds of pig iron in the Dominion in the first half of 1907 amounted to 270,100 gross tons, as compared with 259,947 tons in the last half of 1906 and 282,010 tons in the first half. This is an increase of 10,153 tons over the last half of 1906 but a decrease of 11,910 tons as compared with the first half. The following table gives the half-yearly production, in gross tons, since 1904, as ascertained by this office.

Periods.	1904.	1905.	1906.	1907.
First half.....	120,643	210,206	282,010	270,100
Second half.....	150,299	257,797	259,947	.....
Total.....	270,942	468,003	541,957	.....

The production of Bessemer pig iron in the first half of 1907 amounted to 73,023 tons, against 86,558 tons in the last half of 1906 and 79,051 tons in the first half of that year. This is a decrease of 13,535 tons as compared with the last half and of 6,028 tons as compared with the first half of 1906.

The production of basic pig iron in the first half of 1907 amounted to 161,403 tons, against 110,930 tons in the last half of 1906 and 135,298 tons in the first half. This is an increase of 50,473 tons over the last half of 1906 and of 26,105 tons over the first half.

The production of malleable Bessemer, foundry, forge, and other miscellaneous grades of pig iron in the first half of 1907 amounted to 35,674 tons, against 62,459 tons in the last half of 1906 and 67,661 tons in the first half.

The production of bituminous pig iron in the first half of 1907 amounted to 265,253 tons, against 254,547 tons in the last half of 1906 and 271,169 tons in the first half The charcoal pig iron made in the first half of 1907 amounted to 4,847 tons, as compared with 5,360 tons in the last half of 1906 and 10,661 tons in the first half. In the first half of 1907 no pig iron was made in the Dominion with electricity, but in the last half of 1906 forty tons were so made and in the first half of that year 180 tons were produced.

On June 30, 1907, Canada had 14 completed blast furnaces, of which 10 were in blast and 4 were idle. Of this total 12 were equipped to use coke and 2 to use charcoal. In addition 1 coke furnace was being built on June 30 and 1 charcoal furnace was being rebuilt. Three coke furnaces were also partly erected on the same date, work on which was being suspended for some time.

During the first half of 1907 the total number of furnaces in Canada actually in blast for the whole or part of the period was 12, of which 10 used coke and 2 used charcoal. The number that were idle during the whole period was 2 coke furnaces, one blowing in for the first time in July. The rebuilding charcoal furnace is not considered in this statement.

A WANING CANADIAN INDUSTRY—GLASS.

In a late bulletin issued by the Dominion Bureau of Statistics relating to the manufacturing industries of Canada, reproduced in the August 2 issue of this journal, is an item concerning glass. In 1900 there were 1,438 wage earners in the Canadian industry who earned $549,211 in wages, while in 1905 there were only 1,418 employes who earned only $522,082. This shows a decline in five years not only in the number of employes, but also in amount of wages paid. The bulletin claims that in the years under comparison there was an increase both in the number of employes and in amount of wages paid, a fact which we fail to see as far as the manufacture of glass is concerned.

According to a report of the Department of Trade and Commerce, the value of manufactures of glass imported for consumption in Canada in 1906 was $2,673,031, the duty paid upon which was $561,830; and our exports of Canadian made glass in the same year was valued at $17,337.

The chief countries of production from which glass was imported into Canada in 1902 and 1906, and the values of the imports were

	1902	1906
Great Britain.....	$388,504	$758,404
United States.....	523,820	678,686
Belgium.....	600,549	821,217
Germany.....	300,425	168,842
Total for all countries ...	1,932,539	2,673,031

The Canadian duties on some of the different forms of glass, whether under the British preferential tariff or the general tariff show good reason for the stagnation

and decline in the domestic industry. Thus on common window glass the duties range from 7½ per cent. to 15 per cent.; plate glass, 15 per cent. to 27½ per cent.; silver glass, 22½ per cent. to 35 per cent.; German looking glass, thin, unsilvered, 12½ per cent. to 20 per cent.; stained glass 20 per cent. to 30 per cent.; glass demijohns, bottles, flasks, phials, jars, chimneys, table ware, etc., 20 per cent. to 32½ per cent.

The British Tariff Commission, in their recently issued report on the glass industry in Great Britain, discuss at length the effect of the Canadian preferential tariff on the industry in that country, in which it is shown that the effect of it is not only to increase the trade between that country and this, but, be it said, to the almost total ruin of the Canadian industry. The report directs attention to the fact that the glass industry is one of the oldest British industries: that the British market is one of the best markets in the world, and that British workers have maintained their traditional skill. Yet the evidence brought before the commission shows that the industry generally has deteriorated during the last thirty years. The British glass manufacturers' greatest difficulty is the increasing importations of competing glassware from Belgium, Germany, Holland and Austria; and the report gives many illustrations of the dumping practices in which these foreign competitors indulge. The importations of foreign glassware into Great Britain have increased in the last thirty years by nearly £1,700,000,—$8,500,000 or 94 per cent. On the other hand, the exports of British glass to foreign countries, have shown a marked tendency to decline, especially in the best markets. The Canadian market however, has shown marked increase since the adoption of the preferential tariff. The 1905 total of £150,000 compares favorably with £42,000 in 1875-79. Germany, the report says, is said to have secured "absolute mastery" of the Canadian market in some classes of glass goods in which British manufacturers were previously supreme. The Canadian surtax has, in the last year or two checked German trade with Canada, consequent benefit accruing to British trade. In some cases British manufacturers have found it advantageous to transfer their colonial trade from British to Belgian factories in which they are interested. The Canadian preference, especially in association with the Canadian surtax on German goods, is indicated as the main cause of the recent expansion of British trade with Canada.

It is very certain that the new duties on glassware imported into Canada offer no shadow of protection to the home industry. According to the Dominion Bureau of Statistics, the manufacture of glass in Canada is a waning industry. In five years since 1900 there has been a very large falling off in number of employes and a corresponding falling off in amount of wages. At the same time the imports of glass are increasing most remarkably. In 1902 the imports were valued at $1,932,539, and in 1906 they were valued at $2,673,031, an increase of $740,492. A most important Canadian industry is sacrificed and Canadian skilled labor is forced to seek employment in foreign countries, while foreign labor finds employment in producing glass in foreign countries to the value of $2,600,000 for consumption in Canada. The demand is increasing by leaps and bounds and the home industry is in its dying throes. Why?

The British preferential tariff is chiefly responsible for the situation, supplemented by a desire to get as close to free trade as possible. According to the British tariff commission, the glass industry is also in most desperate condition because of free trade by which Belgium, Germany and other European countries swamp the British market, and British workmen are driven to pauperism. And it is to relieve the distress in Britain that the Canadian industry is sacrificed. It is true that low Canadian duties has enlarged the British market, but they have also enlarged the markets of other countries. Last year we imported glass from Great Britain to the value of $758,000, but we imported from Belgium a much larger value of $800,000, and from the United States, $678,000.

The circumstances are simply shameful.

UNSATISFACTORY CONDITIONS.

At the recent annual meeting of the Toronto branch of the Canadian Manufacturers' Association, Mr. John Firstbrook, the retiring chairman, in his address, according to the report published in the news columns of The Globe, referred to the "unexampled prosperity in every branch of Canadian industry." While, however, every factory in the country is working to full capacity, and orders are being declined each day, the condition of Canada's foreign trade is far from satisfactory. "For the nine months ending March 31," he went on "our imports have increased $47,506,476, or 23½ per cent., but the export returns have only increased at the rate of 2½ per cent. in the same period. Is our fiscal policy on a thoroughly sound basis," he asked, "when in the height of prosperity we import goods in ever-increasing quantities? How long can we bear up against this ebbing of our capital? This is still a young country, and is it not, therefore, time our tariff was framed so as to divert some of the money now going into the pockets of outsiders to those of the Canadian people? When the increase in our export merchandise drops from 20 to 2½ per cent. for the corresponding periods in two successive years is not something amiss with our fiscal system?

"But the home market is the most available, and the manufacturer can truly rejoice in the enormous strides made in the manufacturing industry in the past five years as indicated in the returns just issued by the census department for the period 1901-06. In 1901 the value of factory products was placed at $481,053,375, while for 1906 they stand at $712,664,835, an increase of $231,611,640, or 48 per cent. in five years. Nor is this increase confined to one Province of a few branches of industry. All Canada, every industry, has shared in this truly remarkable expansion due to the development of our vast western wheat fields, our mines our forests and the building of new railways.

"Toronto is well to the front in her share of the general progress and prosperity of the country. As a commercial and industrial centre she stands second only to Montreal, which has the tremendous advantage of being an ocean port. With over 1,200 industrial establishments, numbering 70,000 employees, manufacturing interests are truly most important in the development of our city. That this is recognized by the city officials is seen in the appointment by them last July of a special Commissioner of Industries."

But, he urged, a city was not attractive to the manufacturer unless there was plenty of skilled labor to be had, and this was where Toronto was sadly handicapped. Skilled help is even more difficult to obtain now than a year ago, and the situation was indeed an acute one vitally concerning the welfare of the city as a whole. Factories had expanded altogether beyond the increase in the number of available mechanics. Notwithstanding repeated agitations, the Government persisted in confining its efforts to the encouragement of the immigration of agriculturists and railway laborers, while the importation of skilled labor and factory hands was left to private initiative. This policy, which would inevitably throw the splendid markets of the rapidly developing Northwest into the hands of United States manufacturers, had compelled the Canadian Manufacturers' Association on February 1 last to open a labor department in London, England. In the short space of five months since then, in spite of all the difficulties for organizing such a bureau, over 800 skilled workers have been contracted for to come to Canada, for which nearly 300 have arrived to date. Toronto was getting her quota of these, but they are a mere pittance to the industrial thirst. "The situation," he proceeded, "demands the execution of the same aggressive Government policy to encourage the immigration of skilled labor and factory hands generally that is now pursued in the case of agriculturists. From investigations carried on by the branch two months ago it is conservatively estimated that there is employment for 25,000 additional girls in Ontario alone, of which 10,000 could easily be absorbed in Toronto. The number of male mechanics wanted is incalculable, but the excessive dearth of labor is patent on all sides.

After thinking the matter over for a couple of weeks, The Globe has something to say about it. What it says is, in its own opinion both wise and witty, but of course, in the opinion of many others it is nonsense and foolishness, very closely approaching insults. The Globe tries to convince itself that it knows it all—knows what it talks about, and thinks that manufacturers generally and all who believe that the policy of tariff protection for Canadian manufacturing industries are all wrong. The Globe's editorial says:

When Liberal newspapers lamented and freely complained of the depression caused in Canada by a policy of excessive protection they were condemned as decryers of their country. Their critics, largely among the men who were unwisely protected, seemed to think them responsible for the evil conditions they freely depicted and condemned. Now that the situation is changed and the Liberal newspapers are rejoicing in prosperity everywhere apparent, there is a tendency on the part of some manufacturers, who are the politically reluctant beneficiaries, to complain of the good fortune that is coming to them. The retiring President of the Toronto branch of the Canadian Manufacturers' Association complained in his official address of the great increase in Canada's imports compared with the increase in her exports. This complaint was accompanied by a most satisfactory declaration that there was unexampled prosperity in Canadian industry, that factories were working up to their fullest capacity and obliged to decline orders. While the factories of the Dominion are thus enjoying all the prosperity and all the good times they are capable of accepting, it is complained that the imports for the nine months ended with March last increased forty-seven and a half millions, or 23½ per cent., compared with the corresponding period of the previous year. The complaint is strengthened by the fact that exports increased, according to the same comparison, only 2½ per cent. The complaint leads up to the charge that there is something wrong with the fiscal system.

Just what people want when their factories are working to their fullest capacity is difficult to understand. Neither is it clear how an increase of exports or decrease of imports could confer any benefit on them. It is told that some sailors, given by a mistake of the cook food intended for the cabin passengers, declared that the meat was no good because there was no "chaw to it." It is also told that a lady whose milkman suddenly became conscience-stricken dismissed him because a yellow scum was forming on the milk whenever she laid it away over night. It is worries of this nature that are vexing the Canadian manufacturers, and they attribute them to a defective fiscal system. The Government could easily bring back the old conditions which are now regarded at a distance with some admiration. It would be an easy matter to return to the tough beef and the clear, thin milk. The wheels of industry could once again be clogged and impeded by excessive obstructions to trade. The closing of factories could be made the price of a so-called favorable balance of trade. But the Liberal Ministry is too intelligently desirous of the success of Canadian manufacture in general to accept the cloudy and entangled theories of its protectionist representatives. There is no special gain or misfortune in selling abroad or at home. The most reliable indication of prosperity is prosperity. While it is abundant everywhere there is no use looking for a cause of complaint in the balance of exports and imports.

The readers of this journal need not be told that Mr. John Firstbrook is one of the oldest and most reliable manufacturers in Toronto, or in Canada, is a large employer of labor, knows what he talks about, and is quite as able to size up the situation from actual experience and close observation as the theorist of The Globe, whose expressions are not strengthened by saying that the prosperity of Canada was and is due to "unwise" protection; manufacturers who are the "politically reluctant beneficiaries"; that "it is not clear how an increase of exports or decrease of imports could confer any benefit" on the manufacturers. The Globe loses no occasion to repeat and re-repeat its free trade nonsense until, after a while, it will begin to believe some of it—perhaps—but there are but few who are taken in by its sophistry. It is like the parrot that don't know much but what it knows, or thinks it knows, it keeps repeating. It thinks it is a wise old owl when it is nothing more than a talkative parrot.

Whatever Canada buys it must pay for, and the only way it has to pay for its purchases is by selling such of its products as are not consumed at home; and if there is a deficiency of income from such sales, it must be made up by drawing upon the savings of the people. It does not do to say that the credit of the people is good, and that the deficit is to be considered a debt that will, after a while, be paid in due course of business. It does not do to say that the reserved wealth of the country is a sufficient pledge for the debt unless it can be shown that there is a sure and constant increment of wealth that will prevent the sheriff from taking possession.

In the year 1906 Canada imported free or non dutiable goods to the value of $110,236,095, and of dutiable goods to the value of $173,046,109, a total of $283,282,204

and the duty paid on the dutiable goods was $46,437,440, making the cost of the imports $329,719,644. This large amount was required to pay for the wants of the people in Canada in addition to the goods made in Canada and consumed at home. How is it expected that the cost these foreign goods is to be paid? In the year under consideration—1906—Canada exported domestic produce to the value of $235,483,956, leaving a deficit of $94,235,688. And this on the business transactions of one year only.

How and when is this to be paid?

It can only be paid from the hoarding of the people. In 1906 Canadian exports of coin and buillon were valued at $14,160,375, and the savings of the laboring classes and farmers and depositors generally were depleted to that extent; and that is why money is so difficult to be had, and why such high rates of interest are charged. The extraordinary large volume and value of foreign imports, exceeding the value of all our exports, causes the existing hard times. Our imports and duties thereon in 1906 cost us $329,719,644; and all our exports were valued at only $235,483,956. To apply on this large deficit of $94,235,688 we exported our hoardings of gold and bullion—all we could possibly spare, to the extent of $14,160,375, and yet there is a balance due to our foreign creditors on the transactions of only one year of $80,075,313.

How and when is this $80,000,000 to be paid? We are certainly living in a fool's paradise.

The Globe tells us that the great era of prosperity began in 1897. The records show that in the ten years—1897-1906—Canada imported from abroad merchandise for home consumption to the value of $1,208,933,793, upon which duties amounting to $334,255,707 were paid, and the free, or non-dutiable imports were valued at $790,023,562, making the cost of our imports in ten years $2,333,213,062; and in the same ten years our exports of Canadian produce was valued at $1,799,440,270, a deficit of $533,772,792, an average of more than $53,377,000 per year; and to assist in paying this enormous debt, gold and bullion from the savings of the people of Canada to the value of $40,992,533 was exported—sent out of the country—an average of more than $4,000,000 a year. And thus we see that in what The Globe tells us has been the most favorable ten years of Canada's history—that after drawing more than $40,000,000 of gold, the hoardings of the people, we find that we are yet in debt $492,000,000.

How and when is this half billion dollar debt incurred in ten years to be paid?

THE CENSUS BULLETIN.

The Dominion Bureau of Census and Statistics has issued a corrected bulletin which gives a comparison of the number of wage earners in Canada and the amount earned by them in the different industries during the years 1900 and 1905. The bulletin was published in full in the August 2 issue of THE CANADIAN MANUFACTURER. It tells us that in 1900 the number of wage earners in Canada was 344,035 and the wages earned $113,249,350, and in 1905 391,487 employes earned $164,394,490, an increase of 12 per cent. in the number employed and 45 per cent in the amount earned. The increases were 47,452 in the industrial workers and $51,145,140 in earnings. The statistics make reference to 203 named different industries, which are supposed to include all there are in Canada where there are three or more works of each kind of industries—when there are less than three the figures are grouped under the head of "All other industries." Although the bulletin gives the number of wage earners in each industry, and the salaries and wages earned by them, it does not give the full number of different industries, nor the value of their output in the respective years. If this had been done the information would have been very valuable. Neither does the bulletin give any information regarding the entire lack of information regarding certain industries in 1900 that existed in that year, but is given for 1905, nor why information is given for 1900 but not for 1905. These omissions deteriorate the value of the bulletin. It would have been much more useful as a matter of reference and information had the industries in which there were increases or decreases in number of wage earners been stated in different columns or classifications. On reference to it we find that information regarding certain industries was given for 1905 but not for 1900. We enumerate:

Aluminum and mfr. of	Patterns
Asbestos	Plaster and stucco
Axle grease	Regalias and emblems
Blankets and sweat pads	*Screws
Brass and iron bedsteads	Show cases
Carbide of calcium	Silk goods
Cement blocks and tile	Skates
Chewing gum	Slaughtering
Coke	Spinning wheels
Combs	Stamps and stencils
Confectioners' supplies	Stove polish
Enameled ware	Tallow, refined
Featherbone	Thread
Incubators	Typewriters' supplies
	Woodenware

*Enumerated in 1900, but omitted in 1905.

The following industries show fewer wage earners in 1905 than 1900:

Industries.	Wage earners. 1900	1905
Artificial feathers and flowers	103	71
Bags, cotton	391	63
Baskets	351	322
Batting	87	54
Bicycles	512	256
Bicycle repairs	45	40
Blacking	93	81
Boilers and engines	4,028	2,500
Boots and shoes	13,743	12,940
Boot and shoe supplies	344	340
Boxes—cigar	334	145
Boxes, wooden	2,002	1,507
Brass castings	901	649
Brick, tile and pottery	6,705	6,490
Butter and cheese	6,886	5,956
Buttons	336	164
Carriages and wagons	5,466	5,241
Carriage and wagon materials	987	976

Industries.	Wage earners. 1900	1905
Clothing, men's custom	9,818	6,576
Clothing, men's factory	13,028	8,812
Clothing, women's custom	5,948	4,396
Coffees and spices	551	487
Coffins and caskets	601	509
Corks	119	97
Cottons	12,029	10,450
Cutlery and edge tools	320	105
Evaporated fruits, etc	1,605	920
Fancy goods	177	92
Flax, dressed	1,071	755
Fruit and vegetable canning	4,867	3,787
Furnishing goods, men's	5,385	4,080
Glass	1,438	1,418
Harness and saddlery	2,509	2,277
Ladders	24	11
Lamps	70	49
Lasts and pegs	146	101
Lead, bar and pipe	94	55
Leather, tanned and finished	3,981	3,640
Liquors, vinous	158	107
Log products	55,802	54,954
Matches	488	299
Optical goods	168	163
Patent medicines	598	554
Photography	59	33
Picture frames	508	452
Plaster	100	35
Printing presses	315	133
Pumps and windmills	565	490
Railway supplies	405	265
Salt	208	169
Scales	226	184
Seed cleaning	585	424
Sewing machines	637	461
Ships and repairs	2,528	1,672
Starch	390	374
Textiles, dyeing and finishing	565	544
Tobacco, chewing and smoking	2,351	2,249
Umbrellas	162	154
Washing compounds	18	14
Washing machines	178	171
Watch cases	503	149
Window blinds and shades	304	239
Wood pulp	3,301	2,456
Woodworking and turning	942	785
Woolen goods	6,795	4,642
All other industries	4,120	3,557
Total	190,174	162,143

This showing is remarkable. According to the bulletin there are 203 different industries enumerated, of which 66—nearly one third—show a decline in number of wage earners employed in 1905 from what there were in 1900, amounting to 28,031 persons. In 1900 there were 190,174 persons employed in 66 industries, and in 1905 there were but 162,143 persons employed in the same industries. The bulletin says that in all the enumerated industries in Canada in 1905 there were 47,452 more wage earners than in 1900. In other words there was a general gain in the five years of 47,450 employees, and in 66 industries there was a loss of 28,000 employees. The industries that are enumerated in the gaining column are those relating to railroads, bridge building and supplies for same, etc.

We have another bulletin in which is shown the number of manufacturing establishments in certain industries and value of products in 1905, but not in 1900. It is, therefore, incomplete, and useless for comparison.

EDITORIAL NOTES.

The American Iron and Steel Association has received from the manufacturers complete statistics of the production of pig iron in the United States in the first half of 1907.

The production of pig iron in the first half of 1907 was 13,478,044 gross tons, against 12,724,941 tons in the last half of 1906 and 12,582,250 tons in the first half of 1906. The following table gives the half yearly production since 1904 in gross tons.

Periods	1904	1905	1906	1907
First half	8,173,438	11,163,175	12,582,250	13,478,044
Second half	8,323,595	11,829,205	12,724,941	.....
Total	16,497,033	22,992,380	25,307,191	.....

The increase in production in the first half of 1907 as compared with the second half of 1906 amounted to 753,103 tons, and as compared with the first half of 1906 to 895,794 tons. The production in the first half of 1907 was much the largest in any half year in our history and it was larger than that of any whole year prior to 1899. As late as 1894 the world's production of pig iron amounted to only 25,600,000 tons, which we will certainly exceed in 1907 and almost reached in 1906.

A press telegram from London, Eng., says:—Child workers, according to the annual report by the Inspector of Factories, increased last year by 29,291 to 390,869. Of these 42,613 were "half-timers" under the age of fourteen years, and of this number again 23,728 were in Lancashire.

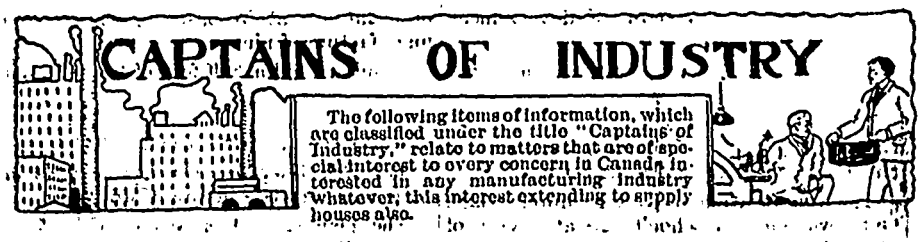
Some of the larger thread manufacturers in Britain employ large numbers of girls sticking labels on reels, skeins and balls by licking them. Miss Squire, one of the lady inspectors, found in one case forty little girls all licking and moistening the adhesive labels by the mouth. "The usual quantity of labels moistened in this way by each girl is about thirty gross a day; some do more."

This in free trade Britain, that utopian land of free trade monstrosities such as Cobdenites on that side of the water and the Toronto Globe on this side.

The total tonnage of merchant vessels built in the United States during the fiscal year ended June 30, 1907, was 1,463 vessels of 510,865 gross tons, the largest in half a century, and exceeded only twice in American history. Construction in 1855 amounted to 583,450 gross tons, in 1854 to 536,046 gross tons. In these years the tonnage built in the United States greatly exceeded the tonnage built in the United Kingdom.

In the past fiscal year steel steam vessels built in the United States numbered 122 of 360,685 tons, by far the greatest tonnage of this description in American history, and about one-fifth of the tonnage built in the United Kingdom. Of these steel steamers, 47 of 238,713 tons were built on the Great Lakes, one of 7,791 tons, being the largest yet built for these waters. Fifteen new lake steamers are each above 7,000 tons. In 1903 the largest steamer built on the great lakes was 5,600 tons.

The total tonnage and average size of steel steamers built for the coasting trade are the largest in history. On the seaboard 24 ocean steamers, each more than 1,000 gross tons, aggregating 98,028 tons, were built the largest being one of 8,579 tons, for the new west coast Hawaiian trade via the Tehauntepec Railway. Only two steamers, each of 6,391 tons, operating under the ocean mail act of 1891 were built for the foreign trade.



The James D. Burton & Son Lumber Co., Barrie, Ont., have been incorporated with a capital of $250,000, to manufacture timber, lumber, wood, etc. The provisional directors include J. L. Burton, W. H. Walter and F. C. Lett, Barrie, Ont.

Mackie Bros., Limited, North Bay, Ont., have been incorporated with a capital of $100,000, to carry on a tinsmithing, plumbing and electrical business. The provisional directors include A. T. Mackie, W. L. Mackie, and B. S. Leak, Pembroke, Ont.

The Smart-Turner Machine Co., Limited, Hamilton, Ont., have supplied Mr. John Greer, Dudley, Ont., with one of their standard duplex pumps.

The new docks of the Toronto Ferry Co. and the steamer Shamrock, Toronto, were destroyed by fire August 6. Loss about $90,000.

The premises of the Merrill Block, Lansdowne, near Brockville, Ont., were destroyed by fire August 5.

The Evans Co., Sudbury, Ont., have installed a new feed pump and receiver in their works, being supplied by the Smart-Turner Machine Co., Limited, Hamilton, Ont.

The Larder Lake International Mines, Limited, Ottawa, have been incorporated with a capital of $5,000,000, to carry on a mining, milling and reduction business. The provisional directors include W. H. Cluff, D. C. McLaren and A. Rosenthal, Ottawa.

The Dominion Bessemer Ore Co., Port Arthur, Ont., have been incorporated with a capital of $7,500,000, to carry on a mining, milling and reduction business. The provisional directors include P. D. Munro, W. F. Langworthy and A. J. McComber, Port Arthur, Ont.

The Smart-Turner Machine Co., Hamilton, Ont., have supplied Messrs. Marsh & Henthorn, Belleville, Ont., with one of their duplex brass lined pumps.

The grand stand and several of the exhibition buildings, Ottawa, were destroyed by fire August 5. Loss about $60,000.

The Columbia Development Co., Cobalt, Ont., have been incorporated with a capital of $500,000, to carry on a mining, milling and reduction business. The provisional directors include M. Carr, F. Wadsworth and E. C. Davis, Cobalt, Ont.

The Hamilton Steel & Iron Co., Hamilton, Ont., have placed an order for a duplex outside packed plunger pump with port valves, with the Smart-Turner Machine Co., Limited, Hamilton. This is the fourth of these pumps they have installed.

Several buildings, including the hardware stores of Richardson & Co., and the Mackay Co., North Bay, Ont., were destroyed by fire August 2.

Wm. Milne & Son, North Bay, Ont., have been incorporated with a capital of $100,000, to manufacture lumber, lath, shingles, etc., The provisional directors include W. Milne, F. Milne and C. E. Coleman, North Bay, Ont.

The Dominion Heating & Ventilating Co., Hespeler, Ont., have closed a contract with the North American Bent Chair Co., Owen Sound, Ont., for a very large shaving system.

The official tests on the new eight hundred kilowatt plant at Morrisburg, Ont., were made recently by Willis Chipman, C.E., and K. L. Aitken, C.E., Toronto.

The Beaty Timber Co., Toronto, have been incorporated with a capital of $100,000 to manufacture timber, lumber, etc. The provisional directors include M. Macnair, J. P. Beaty and K. O. Boyden, Toronto.

The Victoria-Harbor Lumber Co., Victoria Harbor, Ont., have ordered a duplex pump from the Smart-Turner Machine Co., Limited, Hamilton, Ont.

The Ontario Malleable Iron Co., Oshawa, Ont., are building a new core room 88x60 feet, with a lean-to of 30 feet. The old core room will be used for an addition to the moulding department.

The Canadian Wolverine Co., Chatham, Ont., have been incorporated with a capital of $100,000, to manufacture brass, metal, machinery, tools, plumbers' supplies, etc., The provisional directors include R. Gray, Chatham, Ont., L. A. Cornelius and H. C. Cornelius, Grand Rapids, Mich.

The warehouses of the Berlin Omnibus Co., Berlin, Ont., were destroyed by fire recently.

Messrs. T. Dexter & Son, London, Ont., are extending their flour mill to 200 barrels capacity.

The Welland Vale Mfg. Co., St. Catharines, Ont., will enlarge their plant.

The Thunder Bay Contracting Co., Limited, Port Arthur, Ont., have ordered a standard duplex pump from the Smart-Turner Machine Co., Limited, Hamilton, Ont.

Messrs. Scoyne & Renney, St. Thomas, Ont., have been awarded the contract for the construction of the Kelly bridge near that town.

The Methodist Church, Welland, Ont., was destroyed by fire August 6. Loss about $15,000. It will be rebuilt at once.

The Canadian Oil Co., Toronto, have been authorized to do business in the province of Quebec.

Messrs. Westman & Baker, Toronto, will erect a factory at a cost of about $8,000.

The ratepayers of Preston, Ont., have voted favorably on a by-law to loan $10,000 to C. E. Hurlburt, Toronto, for the establishment of a shoe factory.

The Smart-Turner Machine Co., Limited, Hamilton, Ont., have supplied the Hamilton Asylum with a duplex pump.

Representatives of the Hawes-Yongol Mfg. Co., New York, are looking for a site in Brantford, Ont.

The American Street Lamp & Supply Co., a corporation incorporated under the laws of the state of Delaware, have been authorized to carry on business in the province of Ontario with a capital of $40,000. C. S. Smoke, Toronto, has been appointed attorney.

The Hydro Electric Power Commission have sent out a fourth surveying party, who will take up the work of locating the transmission line from Hamilton to Guelph, Berlin, St. Mary's and Stratford.

The Northumberland & Durham Power Co. are considering the question of transmitting power to Kingston, Ont. The point of development will be Healy Falls.

The name of the Maple Leaf Automobile & Electrical Mfg. Co., Galt, Ont., has been changed to the Galt Electrical Mfg. Co, Limited.

J. Davidson, Millbrook, Ont., has purchased the electric plant and has the contract for lighting the town.

The Exeter Canning & Preserving Co, Exeter, Ont., have ordered a duplex pump from the Smart-Turner Machine Co., Hamilton, Ont.

The Stark Electrical Systems, Limited, have commenced work on their new lighting contract at St. Catharines, Ont.

E. H. Keating and Wm. H. Breithaupt have formed an engineering partnership with offices in Aberdeen Chambers, Victoria Street, Toronto. They will carry on business as civil engineers, taking up all questions of railway work, municipal work, power developments, bridges, foundations, buildings, etc. Plans, specifications, estimates, valuations and reports prepared on enterprises and concessions either Foreign or in the Dominion.

Interlocking Piling & Engineering Co, Toronto, have been incorporated with a capital of $200,000, to manufacture steel piling, steel plate, girders, etc. The provisional directors include W. H. Smith, M. Irving and A. Gate, Toronto.

The Chapman Double Ball Bearing Co, Toronto, are placing on the market an automobile bearing of the Annular type. An exhibit of this bearing will be made at the Canadian National Exhibition.

The James Bay Gold Mining & Development Co., Toronto, have been incorporated with a capital of $2,000,000, to carry on a mining, milling, and reduction business. The provisional directors include J. E. Brown, R. D. Moorehead and L. Lynd, Toronto.

The Smart-Turner Machine Co., Limited, Hamilton, are supplying the Temiscaming & Northern Ontario Railway Co. with a duplex steam pump.

The Richelieu & Ontario Navigation Co, Montreal, have awarded a contract to the Canadian Shipbuilding Co., Toronto, for the construction of a ship to be known as the "Rapids Queen."

The Algoma Steel Bridge Co. have been awarded the contract for the erection of the steel bridge to connect Calgary Alta. with St. George's Island. The bridge will be a steel span of 252 feet, with piers of reinforced concrete.

Two highway bridges, 94 feet long and 16 feet wide, with reinforced concrete floor on steel joists will be built at Belleville, Ont.

It is stated that gold has been discovered on property owned by C. Brownlee, Menzie's Island, near Kenora, Ont.

The Department of Marine and Fisheries, Ottawa, invite tenders up to August 27 for about three hundred tons of carbide of calcium for the use of acetylene gas buoys and lights, to be delivered at the following places:—Prescott, Ont., Sorel, Que., Quebec, Que., Vancouver, B.C., Dartmouth, N.S., Charlottetown, P.E.I. and St. John, N.B.

The Borden Condensed Milk Co., of New York, are considering the establishment of a large branch in Woodstock, Ont. The company ask for a free site, free sewer connection and exemption from taxation for ten years.

The Lehigh Portland Cement Co., Allantown, Pa., have ordered three compound duplex outside packed plunger pumps with pot valves and one duplex outside packed plunger pump from the Smart-Turner Machine Co., Limited, Hamilton, for their new works at Belleville, Ont.

The three story building which Jones Bros., cigar manufacturers, Woodstock, Ont., are erecting, is nearly completed.

The Canadian Jack Co., Windsor, Ont., have been incorporated with a capital of $25,000, to manufacture lifting jacks, tools, etc. The provisional directors include N. H. Calkins, H. Greene and F. Philips, Bloomfield, Ind.

The pork packing factory at Aylmer, Ont., was destroyed by fire recently.

The Cobalt Concentrators, Limited, Toronto, are calling for tenders for the construction of a concentrating mill at Cobalt, Ont.

A high school will be erected at Beachville, Ont.

The British Canadian Distilling Co., Owen Sound, Ont., have been incorporated with a capital of $250,000, to manufacture liquor, alcohol, vinegar, etc. The provisional directors include W. Taylor, H. M. Graham and J. P. Raven, Owen Sound, Ont.

Messrs. Pitt & Robinson, Toronto, have ordered a duplex pump from the Smart-Turner Machine Co., Limited, Hamilton, Ont.

A morgue and ambulance house will be erected in Toronto at a cost of about $30,000.

The waterworks system, Amherstburg, Ont., will be improved at a cost of $2,500.

The Neil Shoe Co., Brantford, Ont., have been incorporated with a capital of $100,000, to manufacture leather, boots, shoes, rubbers, varnish, blacking, etc., The provisional directors include F. D. Mackay, F. Mercer and A. E. Knox, Toronto.

A biological building will be erected in connection with Queen's University, Kingston, Ont., at a cost of about $35,756.

The Smart-Turner Machine Co., Limited, Hamilton, Ont., have supplied the Canadian Canners, Leamington, Ont., with a standard duplex pump.

The municipalities of Orangeville and Shelburne, Ont., purpose developing the water power at Horning's Mills. The amount of power which could be developed would be about 300 h.p. The cost of development would be $85,000.

A valuable vein of copper has been struck near Larder Lake, Ont.

The Scott Machine Co., London, Ont., are constructing two test boring machines for the Canadian Pacific Railway Co.

The congregation of Knox Church, Galt, Ont., will erect a schoolhouse at a cost of about $25,000.

T. M. Cullen, Huntsville, Ont., has been awarded the contract for the construction of the waterworks system at Simcoe, Ont.

The electric light system, Newmarket, Ont., will be extended.

The towns of Collingwood, Midland, and Penetanguishene, Ont., have applied for municipal rights to develop electricity at the Severn River.

The Ottawa Electric Commission are making arrangements to take over the street lighting system of the Ottawa Electric Co. The sum offered is $24,000.

The Toronto Street Railway Co., Toronto, have installed a 200 ton hydraulic wheel press, made by John Bertram & Sons, Dundas, Ont.

A bridge will be erected over the Saugeen River at Teeswater, Ont.

The Board of Trade, Ingersoll, Ont., are trying to secure a large steel plant for that town.

The ratepayers of Ingersoll, Ont., will vote on a by-law to raise $95,000 to take over the waterworks plant.

The Canadian Government will establish a wireless station on the Government steamer "Inadra."

Somerville, Limited, Toronto, have placed an order with the Robb Engineering Co., Amherst, N.S., for a 200 h.p. Robb-Armstrong Corliss engine.

Messrs. W. Knack, H. Anderson, H. H. Jackson, F. Bye and C. Howard have purchased the sash factory of S. Hill, Markdale, Ont., and will manufacture furniture of all kinds.

The new cement dam of the Delhi Light & Power Co., Delhi, Ont., gave way August 11, and the rush of water carried the new iron bridge about two miles down the creek. It will take about two months to repair the damage and will cost about $3,000.

The car barns, five cars and twenty motors of the Southwestern Traction Co., London, Ont., were destroyed by fire August 10. Loss about $150,000.

The premises of the Uxbridge Organ & Piano Co., Uxbridge, Ont., were destroyed by fire August 9. Loss about $25,000.

The Bank of Nova Scotia will erect a bank building in Brantford, Ont.

It is probable that with the opening of the branch of the royal mint in Ottawa in November or December next, a new nickel penny may be introduced into the Canadian coinage. The use of nickel in the Canadian coinage would afford a convenient market for the large nickel areas now being explored at Cobalt. The new mint will turn out between 16,000,000 and 20,000,000 coins per year.

The Canadian Pin Co., a recently organized company, are considering the establishment of a factory at Woodstock, Ont., for the manufacture of pins.

A million and a half feet of lumber owned by the Cavendish Lumber Co., Lakefield, near Peterborough, Ont., was destroyed by fire recently. Loss about $40,000.

The Bell Telephone Co. have moved into their new premises in Brantford, Ont.

The planing mill of Messrs. Cole & Co., North Bay, Ont., was destroyed by fire August 8. Loss about $5,000.

The large shingle and lath mill of Miller & Co., Hampden, near Ayton, Ont., was destroyed by fire August 8. Loss about $7,000.

The ratepayers of Amherstburg, Ont., voted favorably on a by-law to spend $2,500 on purchasing a new pump and otherwise improving the waterworks system.

The annual meeting of the Cornwall Paper Mfg. Co., Cornwall, Ont., was held on August 4, and the following officers were elected.—President, S. Greenwood; vice-president, R. J. Pitts, managing director, P. E. Campbell, Cornwall, Ont.; other directors, E. H. Brown and C. Deruhie, Cornwall; M. P. Davis, Ottawa, and J. A. Cameron, Dominionville, Ont.; secretary-treasurer, A. M. Wismer; manager, J. L. McNichol.

The Great Northern Petroleum & Asphaltum Co., Ottawa, have been incorporated with a capital of $100,000, to manufacture oil, petroleum, asphaltum, etc. The provisional directors include H. H. Williams, M. C. Edey, and W. C. Perkins, Ottawa.

The Spruce Lumber Co., Ottawa, have been incorporated with a capital of $45,000, to manufacture furniture, doors, sashes, pulpwood, paper, etc. The provisional directors include B. D. McDonell, Winnipeg, Man., C. McDonell and W. C. Perkins, Ottawa.

Williams & Wilson are erecting a 100x53 foot addition to their machinery warehouse on St. James Street, Montreal. The addition will have a fine Montreal granite and Indiana limestone front and will give this firm an 80 foot frontage in the centre of the wholesale machinery district in Montreal.

The Canadian Fairbanks Co. have remodelled their head office in Montreal. Offices have been fitted up to occupy the entire first floor of their warehouse on St. James Street. These offices are finished throughout in oak and are lighted by enclosed arc lamps. They are consequently exceptionally attractive in appearance as well as convenient.

The Modern Bedstead Co., Sherbrooke, Que., have their new factory at Cornwall, Ont., practically finished. The new premises are constructed of wood and brick, with structural steel foundry.

The firm of Baxter, Paterson & Co., Montreal, have dissolved, Mr. Paterson retiring. The business will be continued by J. R. Baxter & Co. at the present address, 102 St. Antoine Street. Machinery and mill supplies will be the firm's big line.

John Watson & Son, Montreal, recently shipped an ornamental bank railing to Paris to be used in the Bank National. This is believed to be the first of the kind sent to France from Canada.

The Canada Pottery Co., Iberville, Que., recently made their first shipment. Their

specialty is sanitary ware. Clayton Bros., of the Montreal Fire Brick & Terra Cotta Works are the proprietors.

The Best Steel Casting Co., Limited, are erecting a plant at 412 Church Ave., Verdun, Que., at a cost of about $125,000, for the manufacture of low carbon steel castings. The plant will have a capacity of about 40 tons per day, and is expected to be in operation before the end of September. A plant for the manufacture of gray iron castings will be added before the end of the year.

L. J. Marchand has just completed a sash and door factory at a cost of about $20,000, at Boulevard St. Paul, Montreal. He has also completed recently an electric power plant at a cost of about $25,000.

The buildings at the new plant of Jenkins Bros., Limited, Montreal, are now completed. They comprise a main building, of brick, 200x50 feet, two stories and basement; foundry, two stories, 105x60 feet, and power house with two 150 h.p. boilers, and a 100 kwt. generator. This plant will make valves of all kinds for the Canadian and foreign trade. It will be running in about six months.

The Shedrick Rigby Co. Limited, Montreal, have commenced the manufacture of electric flat irons and heating apparatus.

The Sherwin Williams Co., Limited, Montreal, will erect a four story reinforced concrete building 120x50 feet, for the varnish storage. MacVicar & Heriot are the architects. Work will begin at once.

The Imperial Oil Co., Limited, have just added a story 90x80 feet to their Montreal warehouse. Four new oil tanks will soon be built.

T. Prefontaine & Co., Montreal, lumber manufacturers and dealers, have just completed a progressive system dryhouse. The whole plant has been built new within a year, at a cost of $24,000. A shavings press will be installed later.

The Hemming Mfg. Co., Montreal, are moving their offices to 14 St. Helen Street. This company are opening a new department for depositing gold and silver on glass and china, and are pioneers in this line of work in the Dominion.

The acetic acid and formaldehyde plants of the Standard Chemical Co., Limited, Toronto, at Montreal, are now completed and running. The charcoal department of the Montreal plant is being enlarged.

The Canada Axe & Harvest Tool Mfg Co., Limited, Montreal, are equipping their plant to use electric instead of water power as heretofore.

Mr. Samuel Robertson, Montreal, is building an auditorium 300x100 feet near the corner of Grey and Dorchester Streets. It will be used for a skating rink, and will also be suitable for shows and exhibitions requiring large floor space.

E. H. Thurston, Montreal, has commenced the manufacture boots, shoes and sporting goods at 62 Victoria Square.

Daoust, Lalonde & Co., Montreal, have secured the premises now occupied by Ames-Holden Co., Montreal. The building is six stories high, and contains about 65,000 square feet of floor space. The Ames-Holden Co. will move into their new building on Lagauchetiere Street about May next.

The Rhodes Metallic Packing Co., Limited, have moved from Toronto to Montreal, where they have opened an office at 11 St. Nicholas Street.

The factory of the Dominion Furniture Co. and the Junction Hotel, St. Therese Junction, Que., were destroyed by fire August 3. Loss about $100,000.

The tub factory of W. Inglis, Foster, Que., was destroyed by fire August 1. Loss about $10,000.

The Hull Electric Co., Hull, Que., are erecting an addition to their plant.

The Department of Public Works, Ottawa, invite tenders up to August 26, for the extension of Chicoutimi wharf, Chicoutimi county, Que.

The premises of the True Witness Co., the Waters Printing Co., and the Latimer Carriage Co., St. Antoine Street, Montreal, were destroyed by fire August 10. Loss about $15,000.

The St. Lawrence Sporting Goods Co., Montreal, have been incorporated with a capital of $20,000, to manufacture motors, cars, canoes, boats, gasoline marine engines, fire-arms, kodaks, etc. The charter members include J. N. Lemieux, A. D. Leblanc, Montreal, and J. E. Ranger, Lachine, Que.

The Imperial Rubber Co., Montreal, have been incorporated with a capital of $20,000, to manufacture rubber, rubber goods, etc. The charter members include D. J. Angus, F. G. Bush and R. C. McMichael, Montreal.

Dignard, Limited, Montreal, have been incorporated with a capital of $95,000, to manufacture biscuits, jam, confectionery, etc. The charter members include C. Dignard, H. Brosseau, and E. H. Godin, Montreal.

The Natural Gas Supplies Co., Montreal, have been incorporated with a capital of $18,000, to manufacture oil, gas, etc. The charter members include H. P. Douglas, W. L. Bond and H. G. Eadie, Montreal.

Victor Automatic Carriers, Limited, Montreal, have been incorporated with a capital of $20,000, to manufacture motors, dynamos, electrical machinery, etc. The charter members include V. Filteau, F. H. Markey and G. G. Hyde, Montreal.

The Canada Hide & Wool Co., Sherbrooke, Que., have been incorporated with a capital of $200,000, to manufacture leather, wool, oil, etc. The provisional directors include W. F. D. Jarvis, London, Ont., L. R. Dowker and W. J. Budde, Montreal.

The Lachute Graphite Mining Co., Wentworth Township, Que., have been incorporated with a capital of $20,000, to carry on a mining, milling, and reduction business. The charter members include A. Guilbault, Lachute, Que., Z. A. Fournier, St. Andrew's, Que., and J. R. Hyer, Watertown, N.Y.

An electric light system will be installed in Summerlea, Que.

The Canadian Northern Railway Co. are considering the erection of machine shops at Longue Point, Que.

The ratepayers of Cowansville, Que., voted favorably on a by-law to grant $15,000 to Messrs. Woodburn, Sons & Co., of Montreal, who are moving their manufacturing plant to Cowansville.

The sash and door factory of Messrs. Langevin & Bro., Scott Junction, Que., on the line of the Quebec Central Railway, was destroyed by fire August 10. Loss about $7,000.

The sawmill belonging to the estate of A. Cantin, Montreal, which was destroyed by fire May 27, is being rebuilt, and will be completed within two months.

The Canada Foundry Co., Toronto, have been awarded the contract for the superstructure of the two new spans of the Fredericton-St. Mary's highway bridge in New Brunswick. The cost of the spans and the two piers combined with the work of removing the two present spans will be about $55,000.

The Green River Electric Co., Edmundston N.B., have been incorporated with a capital of $49,000, to carry on the business of electricians, etc. The provisional directors include J. E. Stewart, Andover, B.C., T. M. Richards and J. Costigan, Edmundston, N.B.

The horse barns of the exhibition grounds, Halifax, N.S., were damaged by fire August 6. Loss about $6,000.

The Canada Lands, Produce & Cold Storage Co., Belleville, Ont., have placed contracts for the erection of apple evaporating factories at Bridgetown, Middleton, Kingston Station, Kentville, Canning and Lakeville, N.S.

The Cosmos Cotton Co., Yarmouth, N.S., are enlarging their plant.

The contract for the construction of the new power house of the Sydney and Glace Bay Railway at Dominion No. 4, Glace Bay, N.S., has been awarded to Rhodes, Curry & Co., Amherst, N.S. It is estimated that the new plant, including machinery and general equipment will cost about $25,000.

The mills of the North River Lumber Co., North Sydney, N.S., were destroyed by fire July 28. Loss about $100,000.

The Sydney & Glace Bay Railway Co., operating the interurban railway between Sydney and Glace Bay and around the various colliery towns of the Dominion Coal Co., have decided to locate their central power station and car barns in Glace Bay.

A high school may be erected at Sydney, C.B., at a cost of about $40,000.

The Montreal Pipe Co., Londonderry, N.S., will install a plant for the manufacture of car wheels.

A new fire alarm system is being installed in Truro, N.S.

A new jail will be erected at Ashley, N.S., at a cost of about $18,000.

The Nova Scotia Steel & Coal Co., Sydney, N.S., are opening a new mine.

The Nova Scotia Steel & Coal Co. have awarded the contract to D. Sutherland, North Sydney, N.S., for the construction of 2¼ miles of railway for the sum of $50,000.

Steel bridges are to be erected at Goulds and Bay Bulls, Nfld.

A new school house will be erected at Grand View, Man.

The Canadian Bag Co., Limited, are building a factory in Winnipeg to take care of the North-West in cotton and jute bags. The building will be 100 x 160 ft. two stories and basement, brick on concrete foundations. Edward Maxwell, Montreal, is the architect.

The plant will be thoroughly up-to-date, and will represent an outlay of about $50,000. It will be sprinklered throughout. Electric power will be used.

The secretary of the Brandon, Man., school board has written the city council asking that body to add to the estimates $48,000, this amount being needed for this year's current expenses of the board. The sum asked for now is an increase of $18,000 over what the board received last year, and has been made necessary by the opening of two new schools, the other expenses also having increased.

The elevator of the Dominion Co., Hamiota, Man., was destroyed by fire August 2.

Plans are being prepared for the new bridge which the city of Brandon Man., and the Canadian Pacific Railway Co. purpose erecting over the railway tracks and the Assiniboine River. The structure will be nearly one thousand feet in length, and will cost about $80,000.

The Canadian Northern Railway Co. have taken out building permit for the construction of railway shops at Fort Rouge, Man., at a cost of about $200,000. There will be one main building 572x163 feet and three fan houses each 44x31.

The Western Iron Works have been awarded the contract for the construction of the cells of the new police station, Winnipeg, Man., at a cost of about $10,850.

A new municipal building is being erected at Carberry, Man.

The Western Bag Co., Winnipeg, Man., will erect a warehouse at a cost of about $200,000.

The ratepayers of Whitewater, Man., have decided to construct a telephone system.

A sewerage system is being installed at Selkirk, Man.

The Canadian Distilleries, Winnipeg, Man., will extend their plant at a cost of about $200,000.

The Secretary of the Board of Control, Winnipeg, Man., invites tenders up to September 3 for the construction of a power plant at Point Au Bois, Man.

The May-Sharpe Construction Co., Winnipeg, Man., have been awarded the contract for the erection of the Roblin Hall at the Manitoba Agricultural College.

A plant will be established at Portage la Prairie, Man., for the extraction of gas from straw to be used for fuel and power.

A hospital will be erected at Souris, Man., at a cost of about $12,000.

P. T. Thornton, Brandon, Man., has purchased the Wilcox Gold Mine at Timber, Alta., for the sum of $250,000.

The Municipal Construction Co., Regina, Sask., have secured the contract for installing a waterworks system in Battleford, Sask., at a cost of about $50,000.

The flour mill, elevator and electric light plant of the Claresholm Lighting, Milling & Elevator Co., Claresholm, Alta., were destroyed by fire August 5.

A unique proposition is now before the citizens of Edmonton, Alta., and has been taken in hand by the Board of Trade. The scheme is to send a competent man, familiar and thoroughly informed on the resources of Edmonton, through the cities of the Western States and Eastern Canada, to solicit manufacturers to establish here. The intentions of the promoters is to encourage such industries only as will naturally flourish. These would include manufactures of woolens, tanneries, canned meat factories, cotton goods and boots. A canvas for a $2,500 fund is being made by the promoters, and the amount, it is expected, will soon be raised.

The Empire Hotel, Macleod, Alta., is being improved at a cost of about $10,000.

The Bank of Commerce are erecting a *new bank at Gleichen*, Alta., at a cost of about $10,000.

The Bell Telephone Co. have installed a new switchboard in their exchange at Calgary, Alta.

The electric plant at Moose Jaw, Sask., is at present equipped with three boilers, having a total capacity of 450 h.p. These have been found inadequate and the question of installing additional boiler capacity is being considered.

The ratepayers of Leduc, Alta., voted favorably on a by-law to raise $10,000 by debenture for fire protection.

Coal has been discovered in the north bank of the Saskatchewan River about five miles from Prince Albert, Sask.

J. Gray, of the Gray Carriage Co., Chatham, Ont., has purchased a site in Calgary, Alta., on which to erect a carriage factory.

The ratepayers of Medicine Hat, Alta., voted favorably on by-laws to grant assistance to Malcolm's Western Canneries, Limited, and to grant $10,000 for building an isolation hospital and $5,000 to build a new wing to the General Hospital.

Plans for ten miles of street railway in Calgary, Alta., have been prepared and tenders for construction will be called shortly.

A new depot and roundhouse will be erected at Indian Head, Sask., shortly.

The James Stewart Co., Winnipeg, Man., agents for the Canadian Westinghouse Co., have been awarded the contract for the installation of an electric light system in Battleford, Sask.

The North Star Elevator Co., are erecting a new elevator at Asquith, Sask.

The Rocky Mountain Cement Co. will establish large cement works at Blairmore, Alta.

A provincial jail will be erected at Moosomin, Sask., at a cost of about $50,000.

The Canadian Bank of Commerce are erecting a new building at Innisfree, Alta.

Tenders are wanted for the following woodworking machinery, located in Lethbridge, Alta: One turning lathe, with tools, one band saw, one jointer, one pony planer one tenoner, one chain mortiser, one emery grinder and stones, one planer, moulder and matcher (No. 7 Ballentine), one arm sander, one jig saw, one rip saw, one clamp, shafting, pulleys, belting planer and moulding knives and files. John A. MacLean, Fernie, B.C.

Vancouver, B.C., invites tenders up to September 3, for the purchase of the courthouse and site.

The Department of Public Works, Ottawa, invites tenders up to August 19 for the erection of a public building at Cumberland, B.C.

The Canadian Pacific Sulphite Paper Co. purpose erecting pulp and paper mills at Swanson Bay, B.C. The contract for the excavation and concrete work on the pulp mill has been given to the British Columbia General Contract Co., Vancouver, and that for the power dam, pipe line and electric plant to Elliott & McCallum, also of Vancouver. The dam will furnish a head of 120 feet of water, and for the initial installation there will be three Pelton waterwheels.

The *Grand Trunk Railway* Co. have commenced the construction of a branch line from Kitamoat to Kitsalas Canyon, B.C.

Work has been commenced on the new wagon works of T. Brayshaw, Victoria, B.C., to cost $5,000.

R. H. McKee, and several others, Vancouver, B.C., have formed a company and will erect a large sawmill on the north arm of the Fraser River.

There are now twelve blast furnaces at work on the Boundary Mines, B.C.

The Boundary Mines, B.C., are turning out copper at the rate of 4,500,000 pounds daily.

A large concentrator is being erected at the Blue Bell Mine, near Ainsworth, B.C.

M. G. Walker Co., Limited, Winnipeg, Man., have been incorporated with a capital of $20,000, to deal in safes, vault doors, scales, typewriters, billing-machines, cash registers, etc. The provisional directors include M. G. Walker, H. Feint and H. H. Saunderson, Winnipeg, Man.

An amalgamation of the breweries on the British Columbia coast is now being arranged by a number of brewers, headed by Charles Doering, of the Vancouver Breweries, Limited, Vancouver, B.C.

The Standard Oil Co., New York, have just purchased about 12,000 acres of land on Vancouver Island, B.C. The sum paid was $500,000.

A swing bridge will be erected over False Creek, Vancouver, B.C.

The Canadian Pacific Railway Co. are calling for tenders for a steamer 330 feet long with a speed of 20 knots, for a Vancouver, B.C., service.

The Lash Steel Process Co., Cleveland, Ohio, has been incorporated by Horace W. Lash, J. M. Woodward, A. A. Stevens, John A. Chamberlain and J. C. Rogers with a capital of $100,000. The company is formed to promote a new steel making process, the invention of Horace W. Lash of the Garrett-Cromwell Engineering Co.

PUBLICATIONS.

THE ART OF CUTTING METALS—by Frederick W. Taylor, M.E., Sc.D., which was the Presidential address presented at the last annual meeting of the American Society of Mechanical Engineers, has been reprinted and bound in cloth by the Society, price $3.00. This or any other publication of the Society may be had by addressing the Secretary, 29 West 39th street, New York. It is not necessary to send orders through members. None of the publications of The American Society of Mechanical Engineers are copyrighted.

FACTORY OIL STORAGE.—The Bowser Sys-

tem of factory oil storage is described in an illustrated booklet issued by S. F. Bowser & Co., 66 Fraser Ave., Toronto. Illustrations are given as well as sectional drawings showing the method of installing this system for factory use. It may be had from the above address where additional information is also available.

CYLINDRICAL GRINDING.—A 63 page catalogue issued by the Norton Grinding Co., of Worcester, Mass., describes the machines and parts manufactured by this company for cylindrical grinding.

CANADIAN PATENTS.

Below will be found a list of patents recently granted to Canadian inventors in Canada and United States, which is furnished by Fetherstonhaugh & Co., patent barristers and solicitors, etc., head office Bank of Commerce Building, Toronto.

W. D. Beath, Preston, Ont., load and litter carriers. J. A. Cowan, Winnipeg, Man., grain pickling and cleaning machines. Z. S. Lawrence, West Shefford, Que., storage and cooling vats for milk and cream. S. Dean, Waterdown, Ont., fruit baskets. W. L. Lee, Montreal, Que., insoles for foot wear. G. S. McLeod, Winnipeg, Man., mowing machines. C. Duryea, Cardinal, Ont., process for modifying starch. R. Leclerc, Montreal, Que., collapsible boxes. G. J. Dallison, Ottawa, Ont., variable gears. J. P. Sweeney, Windsor, Ont., closures. J. Doepker, Ottawa, Ont., clutch mechanism. L. P. Therriault, Bonfield, Ont., can opener. J. H. Reid, Cornwall, Ont., apparatus for treating ore or like substances.

SMART BAG COMPANY EXPAND.

The Smart Bag Co., Limited, Montreal, well known throughout Canada for the manufacture of jute and cotton bags, hessians, buckrams, paddings, rope and twines, are expanding all along the line, to keep up with the general growth of the country.

The company have enlarged their Winnipeg plant, and its capacity is now more than double what it was formerly.

The Montreal plant, which began operation in January last has already proved to be too small for the demands made upon it, and in consequence, is being extended on the lot east of the present factory. This new addition is expected to be complete by the end of September.

The firm are building an entirely new factory at Toronto, on a site situated on Logan Avenue, and expect to have this plant at Toronto in operation before the end of the fall trade.

The policy of the Smart Bag Co. is to keep their plants right up-to-date. This expansion is a pleasing indication of their faith in the future of Canada.

McGREGOR GOURLAY ENLARGING.

The manufacturing capacity of Galt, Ont., is being increased by important additions to the plant of the McGregor-Gourlay Co., which include a new power house and power plant, foundry building, pattern making and wood shop and pattern storage building.

The power plant will be equipped with a 450 h.p. tandem Goldie & McCulloch engine connected to a 300 k.w. Westinghouse direct current generator. The entire plant will be driven by about 20 direct current Westinghouse motors.

The foundry building is a steel structure 210 feet by 140 feet, equipped with electric travelling cranes and all modern appliances. The pattern storage is a three story stone building 205x55 feet, built specially for the storage of patterns. The pattern making building is also of stone, two stories, 140x55 feet. The present building being used for foundry and storage will be remodelled into a machine shop. The new foundry will have a capacity four times as great as the old one. The addition will mean the employment of about 200 more men than are at present engaged in the works.

ELEVATORS IN NORTH-WEST.

The Department of Trade and Commerce have published a report showing the number and location of licensed elevators and warehouses in the Manitoba grain division, including the Provinces of Manitoba, Saskatchewan, Alberta and British Columbia, with Ontario terminals on the Canadian Pacific, and Canadian Northern, the Midland, the Brandon, Saskatchewan and Hudson Bay, and the Alberta Railway and Irrigation lines.

On the Canadian Pacific Railway there are 917 elevators and 32 warehouses, capacity 28,538,200 bushels; on the Canadian Northern 275 elevators and 20 warehouses, capacity 7,485,000 bushels; the Midland and the Brandon, Saskatchewan and Hudson Bay have 13 elevators, capacity 365,000 bushels; the Alberta Railway and Irrigation line has 7 elevators, capacity 209,000. The Canadian Pacific Railway has 7 Ontario terminal elevators, capacity 11,625,000 bushels and the Canadian Northern Railway has 2, capacity of 7,000,000.

In all there are 1,221 elevators and 52 warehouses, having a total capacity of 55,222,200 bushels.

GRAPHITE.

One of the most important electrical industries at Niagara Falls, Ont., manufactures graphite from anthracite coal and petroleum coke and converts into graphite the forms of raw carbon used in electric furnace work, where high temperature is required, and for electrolytic work, such as the manufacture of caustic sodas, bleaching powders, etc.—in fact, practically all methods of electrolysis. The raw materials used consist of anthracite coal, glass sand, foundry coke, and sawdust, all of which are imported from the United States, except the sawdust.

The furnaces used for the conversion of the anthracite coal or petroleum coke into graphite are in the form of long, narrow troughs, built of fire brick and lined with some suitable refractory or insulating material. In this case the sand, coke and sawdust are used for insulating, by mixing them together in the proper proportions. At the end of each trough is a terminal built of carbon rods, to which is connected the cables conveying the current. The trough is filled with anthracite coal, in which is embedded a carbon rod to make electrical connection between the terminals, as the coal is a very poor conductor of electricity. The temperature to which the coal is raised before conversion into graphite is very high, and is said to approximate 7,500° F., a temperature at which all bodies except carbon are vaporized and driven off.

It is possible to make the graphite practically chemically pure, but for ordinary commercial purposes such a high degree of purity is unnecessary, but it is possible to so regulate the operation that a degree of uniformity of purity is attained which is not possible to secure in the production of natural graphites. When the furnace has cooled sufficiently the graphite is removed, but it is not yet in commercial form and has to be ground to powder and finally separated into the sizes necessary for the various uses to which graphite is put, one of the most important of which is its application as a protective coating for iron and other metal structures.

During the year 1906 there were upward of 454,311 pounds of graphite manufactured here, the greater part of which was exported to the United States. The demand in Canada, though steadily growing, has not warranted the construction of a complete grinding factory such as would be necessary to make all the forms and grades ordinarily required in the trade. It should be emphasized that this graphite is not a mined product, and in comparison with the production thereof the quantity mined in Canada is surprisingly small, the report for 1905 showing that only 541 short tons were mined, valued at $17,032, while the value of artificial graphite for 1906 was $21,579.

AN OPPORTUNITY FOR A NEW INDUSTRY.

Many reports from Germany have reached the United States of an invention that will make possible the use of potato starch in place of cedar in the manufacture of lead pencils. The American Consul at Magdeburg, Frank S. Hannah, sends an official statement confirming the reports. I have used some of these pencils, says Mr. Hannah. They are slightly heavier, but are uniform in size, form and appearance with established makes. They sharpen more easily than the cedar and can be produced at a very nominal figure.

A permanent company was founded in March at Berlin, acting under patents in fourteen countries. Of the working capital $19,050 will be used in erecting a factory with six presses and a daily output of forty eight thousand pencils. The cost of manufacturing, all expenses included,—rent, light, power, wages, composition, lead, selling cost, etc., is estimated at $0,00628 a pencil. A second quality pencil will be made whose cost will be only $0,00595. At the estimated production of forty-eight thousand pencils a day, three hundred working days a year, the yearly production would be fourteen millions pencils. According to recent statistics, the export from Germany to foreign countries equalled 15,166 tons, with the total number of pencils at 3,033,200,000. The cedar wood used at present in the manufacture of lead pencils is expensive and the quantity limited, while on the other hand, the cultivation of potatoes is advancing each year. For these reasons this invention may mark the beginning of a new era in the production of lead pencils.

The Yukon Smelting & Power Co. will erect a large copper smelter, having a capacity of 250 tons of ore per day, at Whitehorse Mine, Yukon.

Manufacturing Iron and Steel at Hamilton.

How Pig Iron and Steel are Produced at the Works of the Hamilton Steel & Iron Co., Hamilton. Increasing Daily Capacity by 300 Tons.

Within a single decade the manufacture of iron and steel in Canada has increased from a position of comparative insignificance to one of great importance. The entire industrial expansion of the country has worked towards this end and made possible the great industries that represent the iron and steel interests. Of the nine plants now in operation in Canada the first to produce pig iron in Ontario was the Hamilton Steel & Iron Co., then the Hamilton Blast Furnace Co., where the erection of a 300 ton blast furnace is now nearing completion. This gives the company a daily capacity of 500 tons of pig iron, but a large portion of this leaves the works as steel bars or angles, spikes, wrought iron and forgings, which the open hearth furnaces, rolling mills and forging shop of the company turn out in large quantities every day.

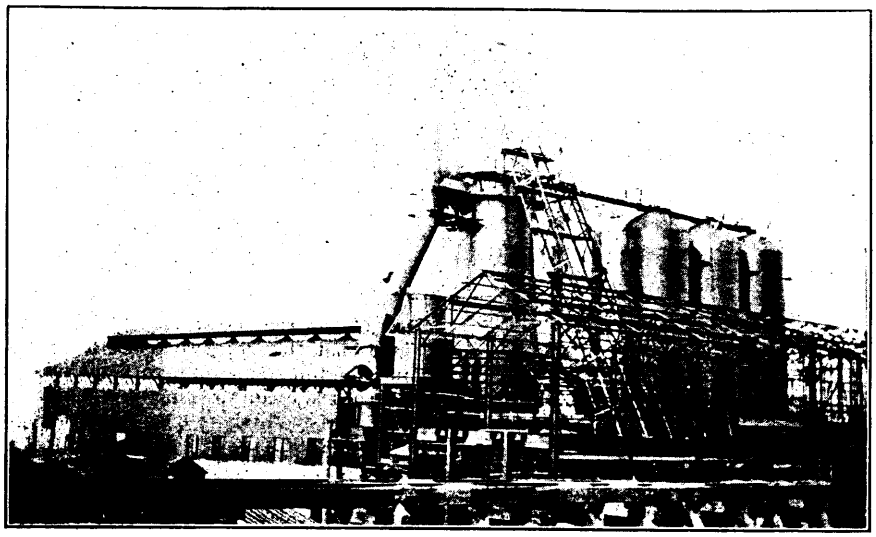


Fig. 1—Hamilton Steel and Iron Co.'s Plant—New Blast Furnace Showing Ore Loading Arrangement, Cast Shed Stoves and Ore Shed.

Extent of Works.

The works of the Hamilton Steel & Iron Co., consist of two plants, one on Queen Street near the Grand Trunk Railway station and the other at Sherman Avenue, where the additional blast furnace is being established. At the Queen Street plant, which includes the head office, are four rolling mills, six puddling furnaces and a large forge department for light and heavy castings. The Sherman Avenue plant ideally situated on Burlington Bay is the more important. It includes two blast furnaces with a daily capacity of 500 tons, four open hearth furnaces, two 30 ton and two 15 ton; two rolling mills, one 14 inch and the other 10 inch, supplied by continuous reheating furnaces. The spike factory has a capacity of 15 tons per day and the machine shop, 150x60 feet, is needed for repair and general machine work.

New Blast Furnace.

The new blast furnace being erected by the Frank C. Roberts Engineering Co., of Philadelphia, is the main feature of interest at the present time. It has a capacity of 300 tons per day and is one of the best and most improved designs known to pig iron practise. The foundation is of concrete supported on piles with several feet of fire brick above the concrete. The diagram illustrates the general outline of the furnace and the illustrations show it in its relation to the stoves and loading arrangements. One of the features of the furnace is the special top where a 7½ h.p. motor works through a system of gears revolving a small hopper, one quarter turn for each car dumped, for even distribution of the load. The top has two bells. The upper bell is lowered by means of a steam cylinder, which has a small hopper underneath that revolves and is dumped into the main hopper. The double hopper arrangement does away with the escape of gas when the bell is lowered. The bell changing apparatus is another feature. It enables the bells to be changed with facility and with a minimum interruption of service.

The foundation work which includes over 1,000 piles was done by Rowan & Elliott, of St. Catharines, the new cast house, ore bin and skip hoist are the work of the Hamilton Bridge Works, Hamilton. Purdy, Mansell & Co., of Toronto, have finished the contract for the steam and water lines, while John Inglis Co., Toronto, are contractors for the steel of the stack and stoves, dust catcher, and hot and cold blasts. This is the largest furnace in Canada.

The Charge.

In the largest furnace the operation continues every hour in the day and every day in the year. The charge consisting of the ore, coke and limestone is placed in the top by means of hoppers and subjected to a blast of hot air coming from the stoves. The amount of materials put in is proportioned on calculations from the chemical analyses of the raw material. Composition of the charge is varied to produce different grades of iron wanted, which includes foundry iron, basic iron, and malleable Bessemer. The basic iron is a low silicon iron and has as few impurities as possible with the exception of carbon. Malleable is a low phosphorous iron. The time taken for the charge to go through the furnace is from 18 to 24 hours

Furnace Automatic.

The one most important part of the new furnace is the fact that the ore and other raw materials are handled entirely by machinery from the time they are received until converted into steel. Take for example the ore. It is received in large 50 ton hopper cars, these are run up on high docks or trestle work into sheds. The bottoms of the cars are then opened and the contained ore passes down into large pockets.

Producing the Ore.

The ore is then removed, as needed, from the bottom of these pockets into small cars which are drawn by an electric motor car. These in turn convey the ore to the skip-car into which it is dumped and in which it ascends to the top of the furnace where it is emptied into the upper hopper, automatically. Thence the ore descends first into the lower

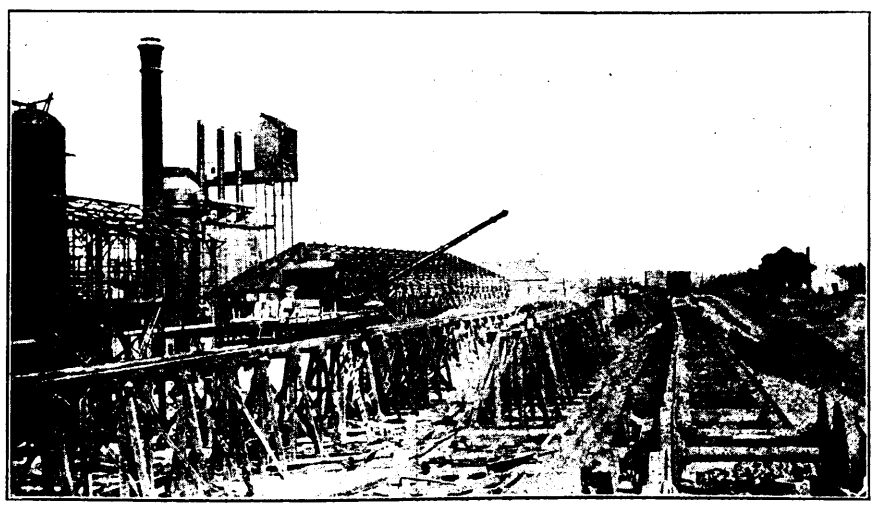


Fig. 2—Hamilton Steel and Iron Co.'s Plant—Ore Unloading Yard and Ore Sheds.

hopper and then into the furnace where the iron is reduced and passes down to the hearth of the furnace, whence after a sufficient amount has collected it is drawn off periodically into a large ladle. This ladle, full of molten iron, after being weighed is taken to the open hearth building, where it is picked up by a large overhead, travelling crane and dumped into one of the furnaces in which it is converted into the finest grade of steel.

Furnace Re-Action.

From the heat of the hot air the coke is burned to C.O. The reaction in connection with the iron being 3 C.O.+Fe_2 O_3= 2 Fe+3 C.O_2, thus removing the oxygen from the ore and leaving the metallic iron behind. The resulting C.O_2 in connection with red hot carbon is again reduced, to C.O. C.O_2 +C.=2 C.O., which again attacks the ore higher up in the furnace. The temperature of the furnace is about 3,500 degrees Fahrenheit opposite the tuyeres, but this temperature gradually decreases towards the top of the charge. The reduction of the ore takes place principally in the upper part of the furnace before it reaches the lower zone when the temperature is high enough to melt the slag. The composition of slag is an important factor in the operation of the furnace. Its degree of fusibility governs the length of time in which the iron will dissolve carbon and its percentage of strong bases, magnesium and lime, measures its affinity for sulphur and silicon.

Effect of Ingredients on Iron.

All foundry iron contains more or less silicon. The action of this element changes the combined carbon into a graphitic state thereby making the cast iron *soft and in*directly lessens the shrinkage.

Sulphur in Iron.

Sulphur combines in all proportions up to 55 per cent. Sulphur makes cast iron hard and brittle. If pig iron contains more than .06 per cent. of sulphur it is not considered first grade. The iron turned out from these furnaces contains from about .01 to .02 of sulphur.

Phosphorus in Iron.

Phosphorus unites with iron in all proportions up to 20 per cent. It causes brittleness especially to a shock strain. It makes the iron more fluid and on that account is used in making thin castings, such as stove plate and ornamental work. Ordinary foundry iron contains from .6 per cent. of phosphorous up to 1½ per cent, for special work. For steel plant work the phosphorus must be as low as possible.

Heating the Air.

The blast furnaces of earlier years were open at the top, thus allowing all the gases to go to waste. The new Hamilton Smelter, however, is equipped with the latest and most modern design of closed top, a system of double bells and hoppers preventing the loss of heat and gas. The gas, which is a by product of iron smelting is used as fuel for the boilers and also for heating the large stoves. These stoves are large cylinders of steel reaching up 90 feet in the air. They are lined with fire brick walls and with the exception of a combustion chamber are filled with checker-work of the best fire-clay bricks.

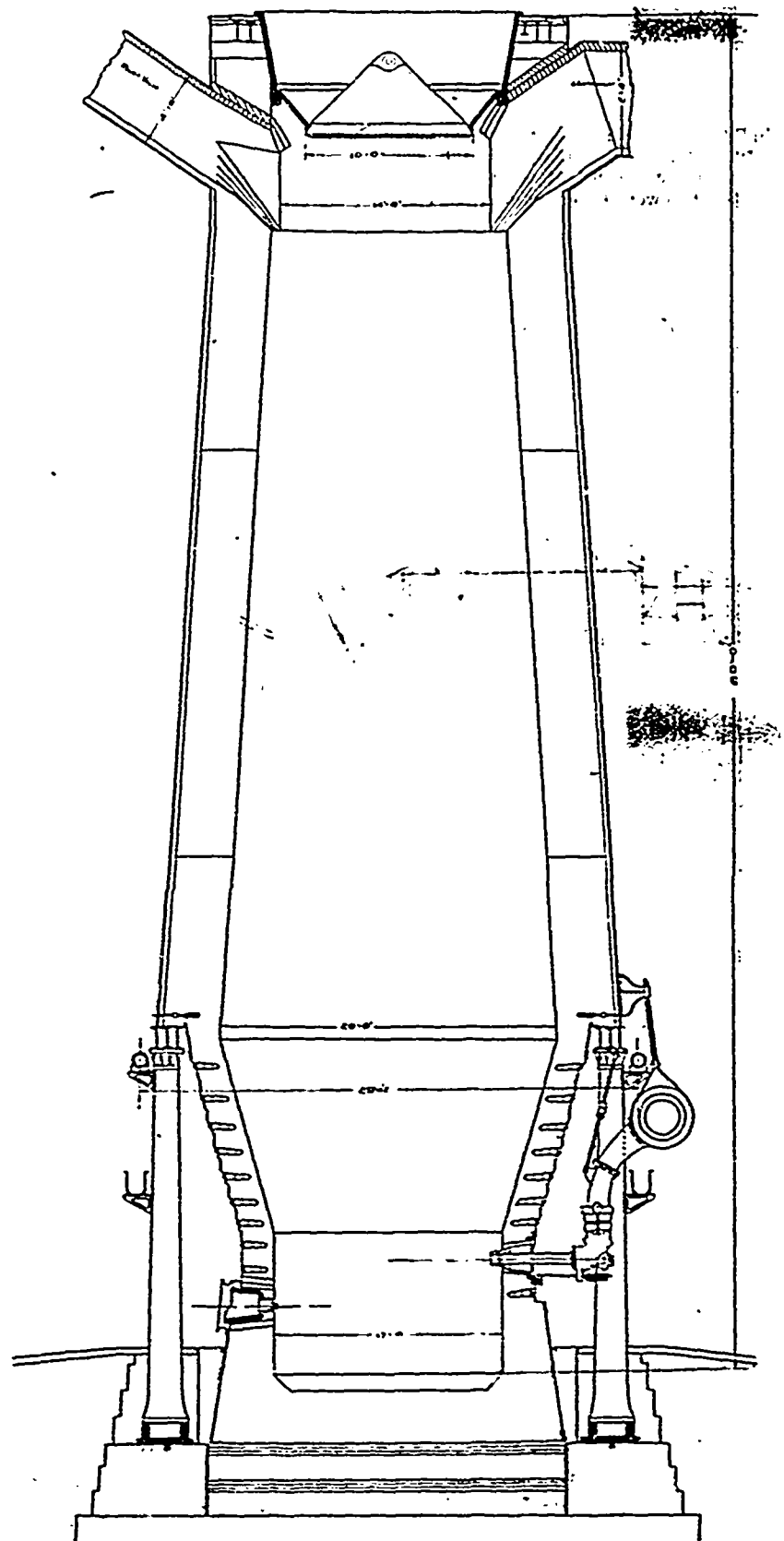


Fig. 3—Hamilton Steel and Iron Co.'s Plant—Elevator of the New Furnace.

Their method of working is as follows. The gas is admitted at the bottom and burned in the combustion chamber. The hot gases travelling through the bricked passages lose their heat, which is absorbed by the bricks. After the stove has reached the necessary temperature the gas is shut off and air from the blowing engines admitted. This air passes through the various flues and when it leaves the stoves for the blast furnace it is the same temperature as the stoves about 950 to 1,200 Fahrenheit. The Hamilton furnace is equipped with three of these stoves.

The boilers are of the Stirling type. They are curved water-tube boilers and develop about 2,500 h.p. The steam developed by these boilers is used in driving the powerful blowing engines, pumps, etc. The engines are upright and about 75 feet high. They are driven at about 35 r.p.m. each per minute, two being in use at one time. The size of these powerful engines may be considered when it is known that each stroke of the piston delivers 385 cubic feet of air.

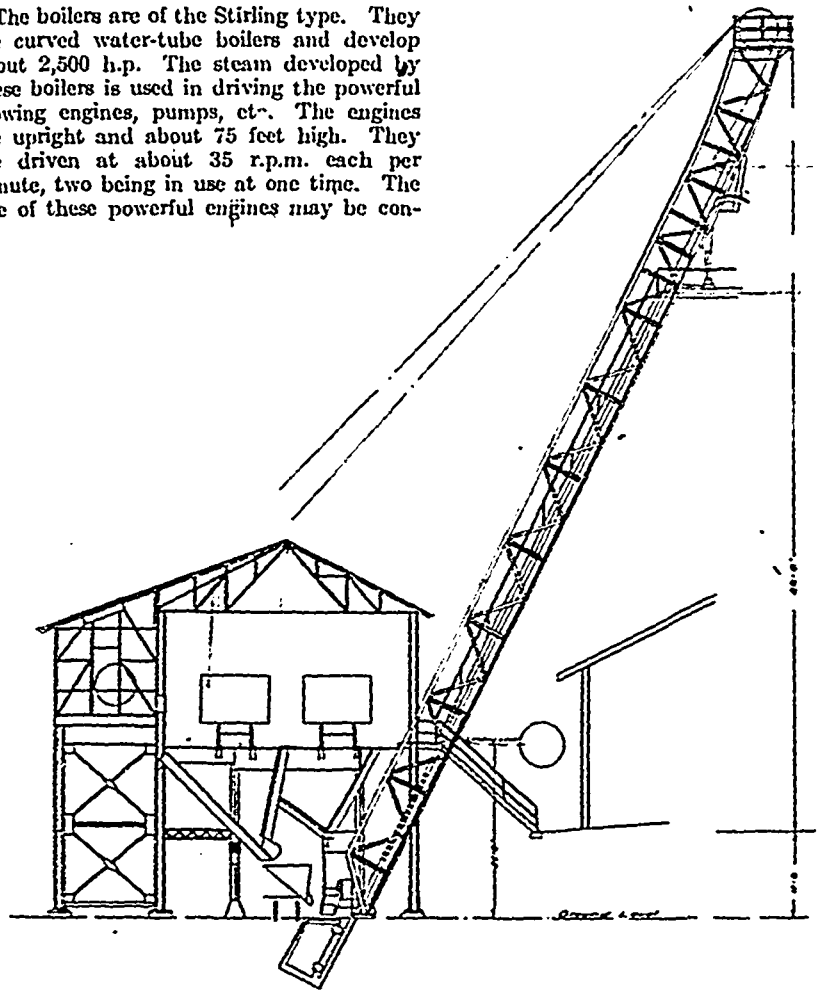


FIG. 4—HAMILTON STEEL AND IRON CO.'S PLANT—SKIP AND ORE BINS.

OPEN HEARTH PLANT.

The open hearth plant of the Hamilton Steel & Iron Co. consists of four basic lined open hearth furnaces, two of these are 30 tons capacity each, the remaining two being each 15 ton furnaces.

The most suitable iron for the basic practise is one which contains very small quantities of silicon, phosphorus and sulphur.

The furnace derives its heat primarily from the burning of natural gas, but the main feature in keeping up the high temperature is the regenerators built in connection. These regenerators are simply chambers filled with brick checker work. The hot gases from the furnace being drawn through one set while the air passes down the other set to the furnace. The direction of gas and air is changed every 15 minutes thus allowing even working.

The charge consists of pig iron, scrap and limestone. After melting the impurities are removed by a process of oxidation and absorption of the oxidized elements by the lime thus forming the slag or waste material.

When the steel is ready it is poured into a large ladle, which is carried by a travelling crane over the group of moulds which are to be filled.

The molten steel runs from the bottom of the ladle down a centre runner and fills all the moulds from the bottom. After the steel has cooled somewhat the moulds can be stripped off leaving the hot ingots ready for the rolling mill, where they are taken and rolled into all sizes of bars, rods, angles, etc.

THE USES OF COPPER.

The average man, if asked to name, offhand, the uses of copper, would be likely to reply that the metal was used mainly for coining pennies and making wire, yet these uses employ barely more than a quarter of the copper that is produced. On second thought he might smile at naming copper coinage as an important consumer of the metal, yet his first thought would be nearer right than his second, for the Chinese Empire has used fifty thousand tons of copper for making new coins within the past two years, thereby increasing the circulating medium of the country to the extent of four ounces for each inhabitant—for while

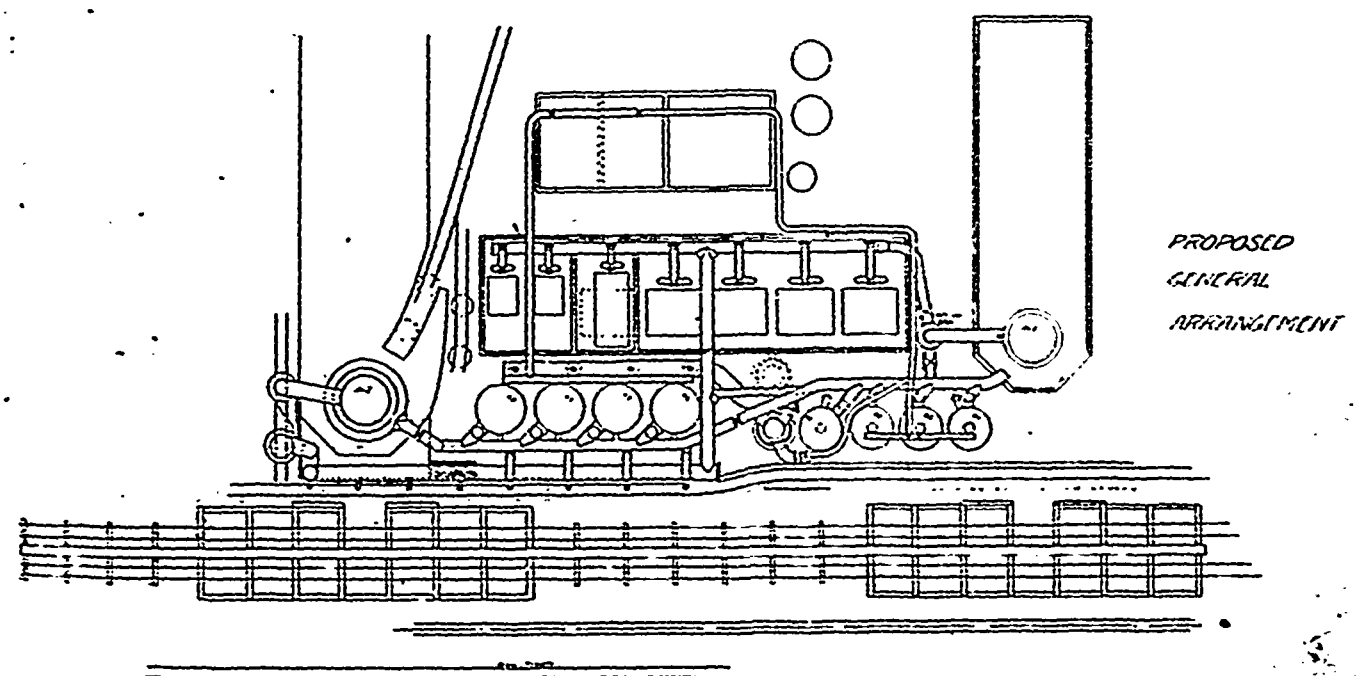


FIG. 5—HAMILTON STEEL AND IRON CO.'S PLANT—GROUND PLAN SHOWING BOTH OLD AND NEW FURNACES.

fifty thousand tons of copper is a large quantity of metal, sufficient to load a thousand freight cars of the heaviest type used on American railroads, it is but a quarter of an avoirdupois pound per capita, when divided among four hundred million people.

Only the expert, or those engaged most actively in the copper industry, have the slightest idea of the diversified uses to which copper is put, as shown by a chapter on the uses of the metal in the new edition of the Copper Handbook, published by Horace J. Stevens, of Houghton, Michigan. According to this book copper enters into almost every form of human activity, and the multiplicity of its uses is most surprising. Electric light, power and traction are immense consumers of the metal in the form of wire, and telephones and telegraphs find it indispensible yet electricity requires only a trifle more than a quarter of the metal made. The engineering trades consume more than half of all the copper produced, mainly in the form of brass, but there are about a score of friction metals and alloys, each having its specific use, into which copper enters as a component part.

The building trades are enormous consumers of copper, and this sort of consumption is increasing rapidly. Copper roofs, cornices, and fronts adorn the exteriors of business buildings in thousands of towns, while for interior work the great majority of modern buildings use copper, brass or bronze locks, knobs and butts. Brass pipes, nickeled, are in modern bath-rooms and lavatories, and brass and bronze chandeliers, gas and electric fixtures are almost invariable. A dozen or more other very common domestic uses of copper are mentioned.

In the manufacturing world the uses of copper and brass are innumerable. One concern in the Naugatuck valley of Connecticut buys copper in ten-ton lots, monthly, solely for the making of watch dials, all of the better grade dials being of copper, enamelled. The common pin requires hundreds of tons of copper yearly, insignificant as a single pin may seem. Bals for shoes and tips for shoe-laces require metal by the scores of tons, and the thin metallic tips on rubber-tipped lead pencils are responsible for a surprising depletion in the stock of the metal.

In addition to the consumption of the metal itself, tens of thousands of tons of copper sulphate are required for the arts and manufactures, and for horticulture purposes, in spraying fruit trees, bushes and vines. It is very evident, from a perusal of the book in question, that copper plays a vital, and a far more important part than commonly supposed, in Twentieth Century civilization.

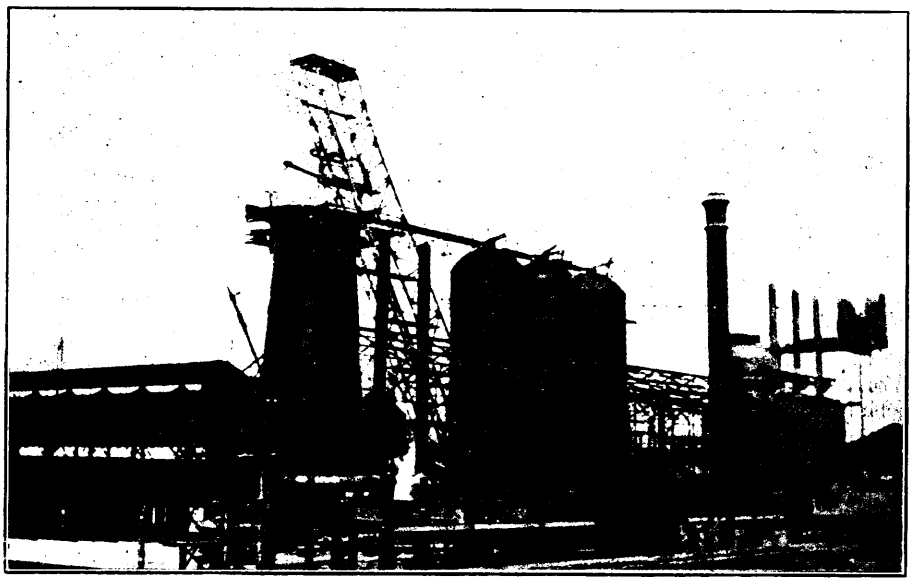


FIG. 6—HAMILTON STEEL AND IRON CO.'S PLANT—BLAST FURNACE IN COURSE OF CONSTRUCTION.

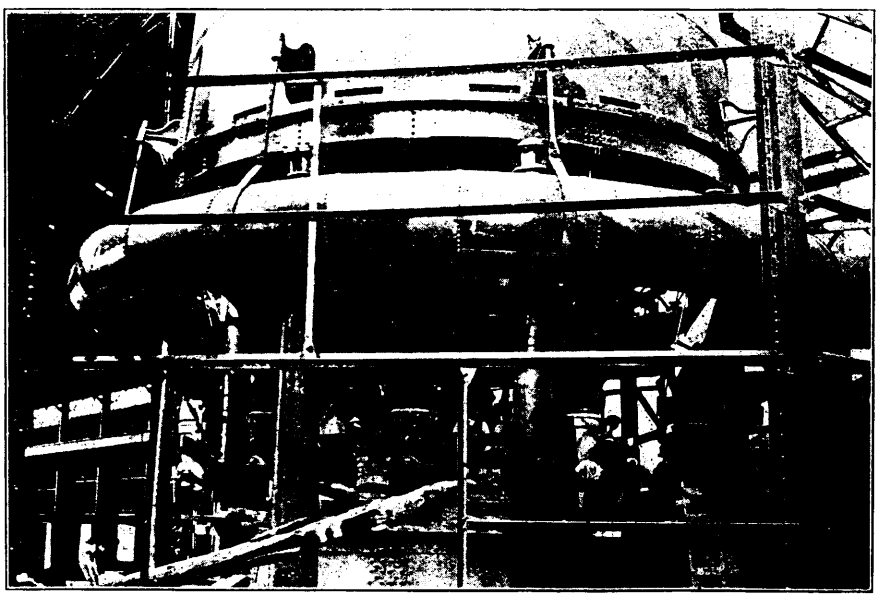


FIG. 7—HAMILTON STEEL AND IRON CO.'S PLANT—BLAST FURNACE IN CONSTRUCTION SHOWING HOT AIR BLAST TUBES.

PIG IRON INDUSTRY IN CANADA.

The Dominion Iron & Steel Co. had all four of their furnaces in blast during the first half of 1907, although three furnaces only were running on June 30.

The Londonderry Iron & Mining Co., Limited, operated their furnace at Londonderry, N.S., for 158 days during the first half of the year. It was out of blast for relining on June 30, but will probably resume on September 1. The company dismantled one of their furnaces in 1905. It was 62x18 feet and was built in 1875-6.

The Nova Scotia Steel & Coal Co., Limited, operated their furnace at Sydney Mines, N.S., for 180 days in the first half of 1907 and it was running on June 30. The company have dismantled their Ferrona furnace, which had been idle for about two years.

The Canada Iron Furnace Co. operated their charcoal furnace at Radnor Forges for 175 days during the first half of 1907 and it was running on June 30. Their coke furnace at Midland, Ont., was also in operation on June 30 and ran for 180 days during the half year.

John McDougall & Co., of Montreal, operated their St. Francis furnace, at Drummondville, for 181 days during the first half of 1907. Their Grantham furnace was being rebuilt on June 30 and is to be ready for blast in September or October. Warm-blast charcoal pig iron is made.

The Algoma Steel Co., Limited, of Sault Ste. Marie, operated their No. 1 furnace for 181 days and their No. 2 furnace for 138 days during the first half of 1907. Both furnaces used coke. Bessemer pig iron only was made. No work was done in the first half of the year on furnaces Nos. 3 and 4, ground for which was broken in 1901 and work soon suspended.

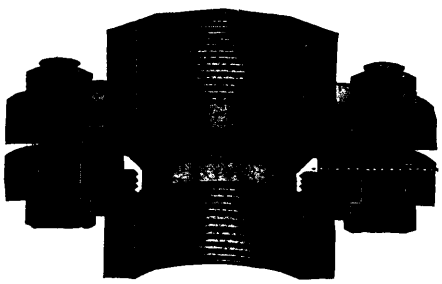
The Deseronto Iron Co., Limited, Deseronto, Ont., did not operate their furnace in the first half of 1907. The furnace was being relined on June 30 and is to be ready for blast early in August. Connellsville coke will be used. Charcoal has heretofore been used.

The Atikokan Iron Co., Limited, Port Arthur, Ont., who broke ground for a coke furnace about two years ago, completed and blew in the stack on July 16 at 3.15 p.m. It is 75x15 feet and has an estimated annual capacity of 30,000 tons of Bessemer and foundry pig iron.

The Hamilton Steel & Iron Co., Limited, Hamilton, Ont., operated their completed furnace for 177 days in the first half of 1907 and it was running on June 30.—The Bulletin.

KEWANEE FLANGE UNION.

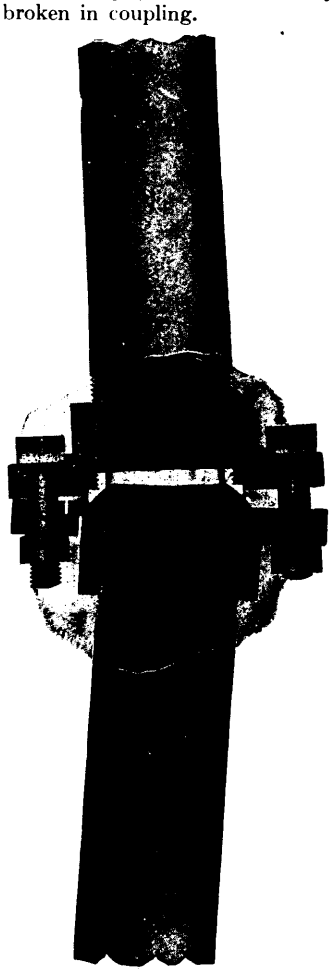
A flange union that can always be made tight and remain so without the use of a gasket, shown by the two illustrations, is being placed on the market by the Western Tube Co., of Kewanee, Ill.



KEWANEE FLANGE UNION.

These Flange Unions are made entirely of the highest grade malleable iron, excepting the brass seat, which is made practically integral with the malleable part by the only method which experience has shown to be enduring. This construction gives a very compact fitting, light on weight and at the same time one that combines extreme strength with rigidity; there is no danger of breaking these malleable flanges in pulling the joints together.

Cast iron flanges, on the contrary, are easily broken in coupling.



KEWANEE FLANGE UNION IS TIGHT EVEN WHEN PIPE ALIGNMENT IS IMPERFECT.

The convex surface of malleable comes in contact with the concave surface of brass; this junction of hard and soft metals insures a more perfect seat than could be obtained otherwise—it makes no difference whether the pipe alignment is straight or not. Each fitting is given a severe air pressure test under water and if not absolutely tight is rejected.

"IDEAL" MACHINES FOR MEXICO.

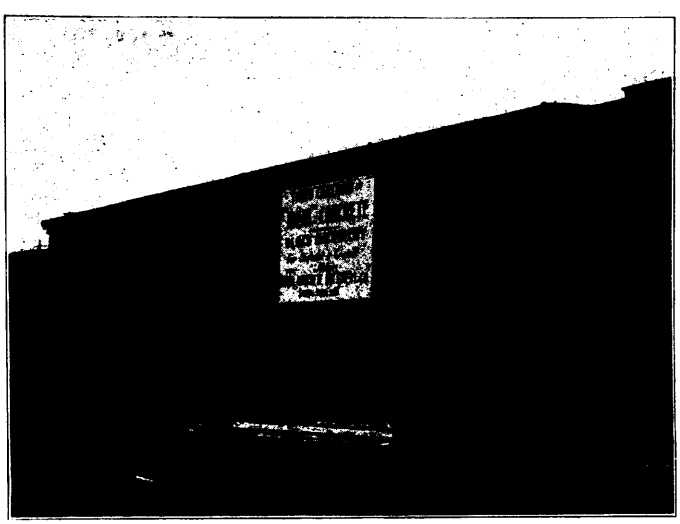
The success of the Ideal concrete block machine, its universal adoption, and the increasing demand from every country in the civilized world, is a modern proof of the ancient saw that "it never rains but it pours."

Recently there left the factory of the Ideal Concrete Machinery Co., of South Bend, Ind., the third car-load of a four car shipment of ideal concrete block machines to Mexico. The fourth car load is practically ready for shipment, and will go forward at an early date.

Heavy shipment of the Ideal machines to foreign countries is becoming frequent. Shipments have recently been made to Valparaiso, Chili; Panama, Central America; Khartoum—Soudan, Egypt; Glasgow, Scotland; Budapest, Hungary; Bucharest, Roumania and elsewhere.

The heavy export requirement for Ideal machines, coming, as it does, to swell the monthly multiplied domestic demand, has necessitated increased factory facilities that rank the Ideal Concrete Machinery Co. among the leading manufacturing concerns of the middle West.

Recent improvements to the Ideal machine make it universal in its adaptability and really unique among machines for cement block manufacture. An attractive and expensive catalogue has recently been issued that is a valuable guide to the home builder and the block manufacturer alike. It is sent free on application, and the information it contains makes it well worth sending for.



CAR LOAD OF IDEAL CONCRETE MACHINES EN ROUTE TO MEXICO. THE THIRD CAR LOAD OF A FOUR CAR SHIPMENT.

ROTARY STEAM ENGINE.

REMARKABLE CLAIMS MADE FOR A SPANISH INVENTION.

The possibility of a revolution in the use of steam power is indicated by Consul-General B. H. Ridgely, of Barcelona, in the following report:

Senor Pedro Puigjaner, a well-known engineer of Barcelona, has invented and submitted to practical trials a rotative steam engine which it is asserted will cause a revolution in all countries where steam power is used. It is claimed for this remarkable engine that it may be applied to all purposes for which steam power is required, whether on land or on sea, and that it consumes but one-fifth the coal per h.p. that ordinary engines consume. For example, it is declared that a ship burning 500 tons of coal per day with the ordinary marine engine would burn but 100 tons with the new invention. It is also claimed that the small relative size of the engine is a great advantage, since it occupies but one-fifth the space occupied by an ordinary marine engine. This also applies to bunker space, but not to the boilers, which are of the usual dimensions.

The inventor says that even when it is a question of motive power of trifling importance, the consumption of coal by his rotative engine is confined to half a kilo (1.1 pounds) per hour per h.p., and does not go beyond this established maximum, which decreases to an appreciable extent when a machine of 100 h.p. is required, and so on successively until the expense of fuel does not exceed a quarter of a kilo (0.55 pound) when the engine is working at 1,000 h.p.

Another claim for the engine is its weight. The ordinary 100 h.p. engine, for example, weighs 15 tons; this one but 3 tons. The inventor also says that the engine being much smaller, the cost of production will also be much less, and it can therefore be sold considerably below the prices of ordinary engines of the same capacity. It is claimed that the economical results thus indicated are not exaggerated, when it is considered that the machine combines all the essential and efficient working capacities of the ordinary steam engines in use at the present day in which the piston with rectilinear motion is employed, including, consequently, those which are the properties of the most improved turbines moved by steam. The inventor has protected his engine invention by patent in Spain and elsewhere and has applied for patent rights in the United States.

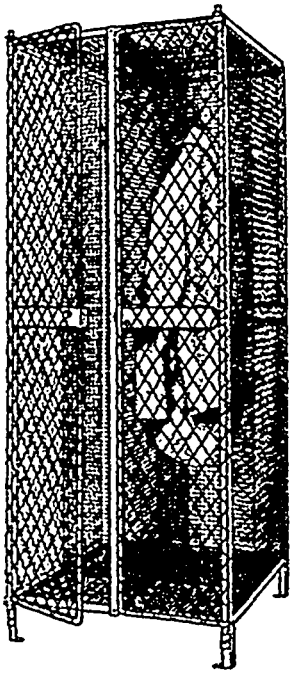
The Spaniards are a progressive people, having taken to inventing rotary engines. Many of these have been invented in Canada and the United States, but they disappear with the last call for stock subscriptions.

Locker Systems in Factories.

During recent years the entire plan in the realm of manufacturing industries has been in the direction of modern methods that go not only to reduce the cost of manufacturing and increase the output, but provide for the health, comfort and convenience of the employes. Many manufacturers have made the latter a special study and always with the most satisfactory results. Happier and more contented employes have been the outcome with greater willingness to strive in the interests of the company and a greater spirit of cheerfulness throughout the entire establishment.

It is only recently that much attention has been given whereby every individual can have a place easily accessible and sanitary, in which clothing and other articles might be kept. One of the firms in Canada to install complete locker systems within the past few months is Christie, Brown & Co., of Toronto, who employ both male and female labor in their works and have installed in two different places in the factory about five hundred lockers for their employes.

These lockers are manufactured by Geo. B. Meadows Co., of Toronto, who at the present



time are busily engaged in installing systems in several other manufacturing establishments, as well as in educational institutions and public buildings throughout the country.

The lockers of the Christie, Brown factory are situated in two different rooms, one for male and one for female employes. By careful arrangement of these it is found possible to place five hundred lockers in the space originally occupied by but three hundred. They are for the most part arranged in groups back to back with twelve lockers to a group and these in aisles allow ample space for dressing and undressing.

These lockers are made entirely of woven steel wire with the exception of frames which are angle steel. The wire in both partition and outside is diamond woven steel No. 11 of about one inch mesh. Each locker is 14x14x72 inches with hat rack on top and three coat and hat hooks. The locks are of a special pattern, no two being fitted by the same key. The master key held by the watchman fits all locks.

As the lockers are open on every side and the contents exposed to light and air they are thus perfectly sanitary. This naturally is a point favorable to the health of the employes, which is a great consideration where a large number are working together. The neat appearance of the lockers is very noticeable and no doubt induces tidiness on the part of the employes. This is due somewhat to the fact that everything is visible from the outside. In view also of this last fact it is more or less protection against pilfering, as articles kept in the enclosed lockers might be concealed and carried away when convenient season offered, but concealment is impossible in case of the wire lockers.

As they are perfectly fireproof they have been recommended by fire underwriters. It might be noted in this connection that McGill University have just ordered four hundred of the lockers for the new engineering building, there being some suspicion that the fire originated in the wooden lockers used by the students in the various branches.

The free circulation of air throughout these lockers serves to dry any damp clothing placed in them. It would also be impossible for employes to keep liquor or other undesirable articles without being detected.

Christie, Brown & Co. are highly pleased with their investment in this direction and are satisfied that it is a step appreciated by their help.

Healthful Conditions in Factories.

The Massachusetts State Board of Health has just reported the results of its investigation of conditions affecting the health of employes in factories. Attention was paid chiefly to those in which one or more of the essential processes involve exposure of the employes to possible unhygienic influences inherent to the industry.

It is shown that the in-door occupations of chief sanitary interest are those which involve exposure to irritating and poisonous dusts; exposure to irritating, poisonous, and offensive gases and fumes; contact with poisonous substances; extremes of heat and excessive dampness.

Of the several classes of dust,—those of vegetable, animal, metallic and mineral origin,—it is difficult to determine which is the most irritating to the respiratory tract; but the vegetable dusts are commonly so regarded in spite of the well-known fact that the occupations in which the employes inhale minute particles of steel, glass, and stone are remarkable for their high death rates from tuberculosis of the lungs. But not all the dusts of one class are equally irritating; flax and cotton, for example, are more irritating than wood; steel is more irritating than brass; horn is more irritating than bone; granite is more irritating than marble, and glass far more than granite.

Workers exposed to dusty atmospheres are especially prone to disease of the lungs, especially pulmonary tuberculosis, the constant irritation bringing about a condition of the mucous surfaces which more readily admits of invasion by the specific germs. Those who are exposed to poisonous dusts are, unless proper precautions are observed, likely to fall victims of chronic poisoning. The most dangerous of the metallic dusts met with in this investigation are those of lead and its compounds.

There is no reason why these conditions should persist, for this investigation very clearly shows that they can be overcome if mechanical means are adopted. In the form of the fan blower or exhauster such means are constantly referred throughout the report as being successfully applied for the purpose. The entire report is wonderfully suggestive of the progress which is being made in thus improving the hygienic conditions in manufacturing establishments.

Industrial Education.

By J. W. Van Cleave

Here is an exceedingly important part of the general labor question. Industrial education will transform children's work into play, and at the same time equip the children to do the highly skilled and high salaried work for which we manufacturers now have in a large degree to rely on foreigners, our apprentice system having been virtually abolished in many trades by the labor unions.

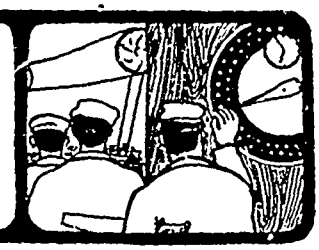
Attach a manual training department to every public primary school in the United States. Let every boy from ten to fourteen years of age pass an hour each day in the use of tools, under a competent instructor. By the age of fourteen he will be able to handle most of the tools used in the ordinary mechanical trades. Establish industrial high schools, into which boys who have taken the manual training course in the primary schools can enter. Two years in these industrial high schools will qualify these boys to be first-class mechanics.

This industrial course, moreover, has an additional advantage. Practical educators testify that boys who give an hour a day to manual training make greater progress in their regular school studies than do the boys who omit this instruction.

As compared with the ordinary apprentice, the average boy who takes the manual training course in school has greater initiative, alertness and versatility. He is quicker in grasping new ideas and has greater skill in meeting and in shaping new conditions. Moreover, the apprentice system has practically been abolished, and will be completely abolished in a few years, unless we prevent it. Therefore, the adoption of some widely diffused scheme of industrial training for the youth of our land like that which I have mentioned is rendered imperative as a means of maintaining our prominence among the world's industrial nations.

Office Methods and Appliances

A Review of the Latest Suggestions in Office Systems and Supplies for Manufacturers.



Commercial Phonograph and Graphaphone.

There are two machines on the market to-day used commercially for the purpose of dictating correspondence, and legal testimony, etc. One is called the phonograph and the other the graphaphone. It will be observed, says the N.Y. Commercial, that they are practically the same word with the syllables reversed. The machines themselves differ in a few mechanical details, but the results attained by both are practically the same, and the mode of operation is in point of fact identical.

The phonograph as a scientific toy was first discovered by Thomas A. Edison. He invented sound waves on a cylinder coated with tin foil, and after a series of experiments discarded it as having little or no commercial possibilities. In 1886, at the Volta laboratory in Washington, D.C., Professor Charles Sumner Taintor, and Dr. Chichester Bell, working in conjunction with Professor Alexander Graham Bell, the inventor of the telephone, took up the work where Thomas A. Edison had dropped it. They formed cylinders of pasteboard, with a thin coating of wax, which when revolved under the point of a cupped sapphire, gave them a fine record of a sound wave. While this form of cylinder was not so plastic as those now in use and was rotated by means of a treadle mechanism, it produced results, and was the nucleus of what has since become a huge industry.

The machine was primarily intended for dictation purposes, and the reporters in the house of representatives installed them at once, and dictated to them their shorthand notes taken in the assembly. These were transcribed without difficulty on a typewriter by a lady, who, although no longer young, still resides in Washington. The machines so fully demonstrated their utility, and effected such a vast economy of time, that they have been used ever since, in one form or the other, for recording the debates of legislative assemblies throughout the United States.

Almost by an accident a song one day was sung into a machine in the reporters room at Washington, and to the astonishment of all who heard it, it was reproduced with remarkable clearness. This was the origin of the musical end of the phonograph and the graphaphone, and this branch of the business developed to such an extraordinary degree that for many years the business or commercial adaptability of the machine was permitted to languish.

During the past few years more attention has been devoted to this branch, and the machines produced to-day for dictation purposes are marvels of economy and utility. The up-to-date business man uses the phonograph or graphaphone for dictating his correspondence. The machine connected with an ordinary electric light wire is placed close to his desk; in fact at his elbow, and is always ready for instant service. A wax cylinder capable of recording a large number of words is on the machine. By touching a small lever the cylinder revolves, and the principal dictates his letters into the machine. The machine can be started or stopped in a moment. Directions to the operator may be given by talking them into the cylinder, just as though one were speaking to the operator. Changes or alterations may be made as one progresses. The dictator may speak just as fast as he can think. The machine knows no limit in speed. Remarks on spelling, etc., may be interpolated at any stage of the dictation. One may emphasize any portion of the dictation by a louder or more stern tone—all will come out on the record, and if the typewriter operator does her work, all will be reproduced in written characters on the typewriter. By this plan the stenographer is dispensed with and only the services of a typewriter operator utilized. The operator takes the cylinder containing the record of the dictated matter, fixes it on her machine, places the ear pieces in her ears, and starts her machine. As the phonograph or graphaphone recites the dictated matter she transcribes it on the typewriter in the ordinary way. The final results are it is claimed, better under this plan of operation than by any other system, more work in a given time, with less errors.

The phonograph and graphaphone are being rapidly adopted in business for a variety of purposes along the lines indicated. They are also used by many well known literary people to dictate their original manuscript; by clergymen for preparing their sermons and in this case another advantage presents itself, for the reverend gentlemen have the opportunity of listening to their own addresses if they think fit. The machine is used by lawyers for preparing briefs, for recording testimony and dictating shorthand notes. Many physicians use them for recording and registering cases. It is used by the government in many of its departments, among others the navy, the post-office, the Interstate Commerce Commission, and the bureau of reclamation.

Another useful phase of the phonograph or graphaphone is that of the teaching of languages. By utilizing the machine, it is possible to reproduce the exact intonations and pronunciation of any language. Printed text-books are used in the ordinary way, and these are supplemented by from 20 to 26 phonograph records, which will repeat as many times as may be desired the correct pronunciation of sentences. Records are prepared in English, French, German, Spanish and Italian, and the best possible results are obtained by their use. No records have yet been prepared in the new universal language, Esperanto, but doubtless these will be procurable at an early date.

Another use for the records has been found in preparing exercises for increasing the speed of shorthand writers. Matter is dictated in the usual way, and repeated by the machine time and time again until the stenographer is able to write the matter at the rate dictated.

There is a great and growing demand for the phonograph and graphaphone, as is amply proved by the fact that during the past 12 months the sales of the commercial machine have increased 500 per cent. Two large companies are doing their best to prove to the business man the great economies to be effected by the use of their machines, and there is no doubt they can well prove their case.

Business Not Self the Thing.

"And why isn't he here any more?" The question was asked of the owner of a business whose general manager was not visible. The general manager had been a starting example of the successful man, or the man just about to grasp success, and the visitor was surprised, not to say shocked, to hear that he had been let out.

"Well," said the boss, "I guess it was because there was too much personality about him. That's a little obscure, without some explanation, but it's the situation all right. He couldn't or wouldn't efface himself enough in performing his duties. He had too much I in his thoughts. 'I want to do this that way,' he would say to himself before starting out to do a thing or to have it done. Not 'it is to the firm's advantage to have this thing done that way.' I haven't got time to go into the case more fully with you. That was his trouble, however; didn't count his work as more than himself. And that's something that a man must do if he's going to be efficient and successful."

The foregoing summary of this particular boss' remarks expressed a real truth, writes Martin Arends. To win success, in the modern accepted sense of the word, a man must subjugate himself, must render his personality and self inconsiderate when compared to his work, whatever it may be. The work demands all, and the man who wants to win his way by efficient devotion to work has no room for worship, or even for development of self.

The business world, the professional world, every world or circle that is measured by human endeavor and attainment, is filled with the failures who hugged their own personalities in preference to their work. It is a broad statement, but facts prove that

60 per cent. of failures can lay their lack of success to no other cause than this.

What are the hall marks of the man who has failed because he did not sink himself in his work? They are easy enough to find, and plentiful. Self in mankind manifests itself in many ways. One man may indulge himself by exhibiting little traces of smallness in his daily conduct. The sentiment which produces that dirty little worm so common in the industrial world known as "spitework" is one of the surest failure producers. Also, it is one of the most common. Its effect is just as sure to be fatal to the best interest of the worker as is that side of self which evidences itself in a subservient pandering to appetite, appetite for drink, for pleasure, for anything and everything that detracts from one's capacity as a worker and unit in the great machine of commerce.

Avoid Bitterness.

No one ever knew of a man who permitted himself the luxury of indulging his pettiness in spitework to succeed. There was a banker once, a great banker, it may be said, who was pleased to be spiteful when the opportunity offered. Nature had cursed him with a violent disposition, coarse temper and pepper-box tongue. He formed violent dislikes of persons at a moment's glance, and thereafter he was sure to show this dislike in an unpleasant manner. Lots of people have this disposition, but the banker was an exception to the rule in that he actually went up, hand over hand, until he stood at the top, or at least within easy reaching distance of the top of his vocation. It took him a long time to do it, something like twenty years of unremitting grind, and as he went he sowed his temper along the road in a way to grow him a nice, big crop of enemies. The enemies matured along with the banker, and just as he fancied that he stood at the pinnacle, safe and secure from any possibility of disaster, the foundation sands caved in under him and he went down with a crash that rang throughout the country and caused a financial scramble such as had not been seen for years.

"They got him, at last," said the Street, which knew the inside facts of the banker's rise and decline. "If —— had only schooled himself to leave his personality behind him when he came to his office he'd still be where he was. But he didn't do it, and now he's knocked out."

The case of the banker is an isolated one in that he actually got up before his indulgence wrecked him. Most of those who are failures because of their personalities never get their heads above the crowd. They don't get a chance to do it, simply because those who have the power to give the chances know that they are disqualified from the outset. They are not legitimate candidates for the higher positions. "Abandon self all ye who enter here," might be written above the doors of industrial offices. The rank and file can enjoy the luxury of a personality, but for the leaders the work is all that is possible.

The man who is unable, or who refuses to control his temper, is in the same class and a candidate for the same end as the man who gives way to petty dislikes. The modern industrial machine is a smooth and fine one. Its works are of iron, but velveted at every point of contact to prevent any trace or suspicion of friction, disorder or disturbance of any kind.

"How is it that man is only a clerk in the office?" once was asked of a department store manager. The man referred to was a remarkable specimen of apparently true manhood and worth. Strength of character and shrewdness fairly radiated from him. He was quiet, industrious and resourceful to a degree. Obviously he was fitted for a better position. "That's our fighting man," said the manager. "Every once in awhile he gets mad at somebody and fights or wants to fight. Most remarkable chap, regarded personally, but impossible at anything but a clerk. I've told him twice that he could have something better if he'd overlook the things that he takes offense at. But he won't do it; said he didn't want to." And thus was this man doomed to failure.

Self Biased.

And then there is the man who wants to "do things in a certain way." He's the man who is prejudiced so strongly in his own favor, that he can't for a minute believe that anybody else's suggestion, not even that of the man above him, is superior to his own idea, no matter what the subject. He is so stubbornly "set" in his thoughts that he has positive ideas on every subject under the sun. He tries to put them all through, and all his life he goes around kicking and wondering why other men with half of his ability are winning their way while he is a failure. Few men will recognize themselves under the above description, but it applies to many of them.

To Win Out.

Strength of character is an excellent thing, but it is to be accepted that if such strength of character is to be compatible with a commercial success it must be of a plastic kind that readily lends itself to bending to fit the exigencies of conditions and position. It need not be a spineless sort of strength but emphatically it must be a supple sort of one. A cultivation of self does not jibe with success. It is the work that must be master; the man must mould himself to fit it. It is a sort of a grim fact but fact it is. The success chaser finds it true before he is far on the road if he does not know it in the beginning. So if you want to win success, leave yourself behind. The question is: "Do you want to win at that price?

Cost System in Manufacturing

The manufacturers in every line have to rely upon those who have a definite system of cost of manufacture for definite statistics about the cost of production, and it is invariably the rule that those employing an efficient Cost System are the most successful the safest expanding and most reliable concerns in Canada.

The success or failure of a company does not depend upon a large output. The success or failure of a salesman as a profit earner for the house does not depend upon a large turnover of sales. The real essence of a profit-maker whether a business or a salesman is the percentage of profit in comparison to the cost of realizing same.

Appreciating the value of knowing the minute cost of each article manufactured, and knowing the results weekly or monthly, being such an essential feature to a manufacturing house, why is it that so many of our large manufacturers do not adopt an adequate cost system. The expense of running a cost system once installed, in an ordinary manufacturing concern, should not exceed one clerk to devote his entire attention to the work, and the cost of installing the same is not a heavy item. In these days of adequate loose leaf devices, adding machines and typewriters, having a capacity of turning out eight and ten manifold copies there is no necessity of a large staff of clerks in this end of the business.

In the majority of plants it is possible to number each article manufactured, and keep absolute cost of labor and material, each job that is turned out complete will take so many pieces of each part, so that it is a simple matter to assemple the entire cost.

While making out orders for a factory it is an easy matter to run off extra copies of the order, not only for various departments in the factory, but for the cost department.

The ratio that over-head charges bear to the wages is a simple matter to compute each month, and while on this point it would no doubt surprise many factories to know just what percentage of their wages the over-head charges actually were. By over-head charges we refer to rent, light and power, superintendance and general factory expense as well as administration.

Now, having arrived at a basis of cost on each article, the value of the statistics, by keeping track of profits of each salesman can readily be appreciated: Some factories may be surprised to learn that the salesman selling the most goods has the least profit.

The application of the cost system for the making up of new price books, for the compiling of records, and for information of the manager necessitating new methods of manufacture, or of aiding him in competing against a house who does not know their cost and who manufacture articles, and for the purpose of showing whether a job has been turned out at a loss at one time, so that inexcusable repetition of the same error would not occur when the order was again offered at the old price.

There are too many concerns to-day working at their old price book assuming that it is correct, making big money on some lines and actually losing money on others. Now, with the adequate cost system installed with this concern, the lines on which the money is being lost can be cut out, and the profit bearing orders handled and pushed to the further advantage of the concern.

A DEPARTURE IN TYPEWRITERS.

If the extravagant expression, "a revolution in typewriters," were applied in announcing a new invention by Roy D. Parker, Goshen, N.Y., it would at least have foundation in fact from the nature of the movement which is the new feature. The letters instead of being struck in a longitudinal line against a horizontal platen, follow one another around the circumferences of a vertical platen. The advantage gained is the avoiding of shifting the carriage at the end of each line, the only movement necessary being the raising of the platen the distance between lines. In a sense it may be called

a rotary continuous typewriter, where all others are reciprocating intermittent typewriters. A simple depression of the key raises the platen one, two or three notches to give single, double or triple space, and the cylinder continues to rotate in the same direction, so that it is possible to write a whole page without removing the hands from the keyboard. To prevent the breaking of syllables at the ends of lines an automatic device moves the platen to the starting of a new line when the space bar is touched near the end of the line. For paragraphing, by depressing a certain key the platen is elevated and revolved to start a new line regardless of where the last line ended. The machine is a visible writer, and has a tabulating attachment. The patent was granted July 16, 1907, and a company has been organized to manufacture the new typewriter, known as the Parker Typewriter Co.

Distribution of Establishment Charges.

DESCRIPTION OF A MACHINE UNIT SYSTEM BY WHICH MANUFACTURING EXPENSE IS PRO-RATED OVER COST OF RUNNING MACHINES, STEAM OR K.W. HOUR.

BY D. C. EGGLESTON, M.E.

Referring to this subject of so much importance to the management of all factories, I desire to call the attention of your readers to the machine unit system by which all expense items are distributed as a load on machines, expense accounts being credited and individual jobs debited.

In our business all expense items are grouped under six main heads in the following manner:

MACHINE EXPENSE.

(a) Fixed Charges—
1. Depreciation of machinery.
2. Insurance on machinery.
3. Taxes on machinery.

(b) Power—
4. Coal.
5. Oils.
6. Waste and sundry supplies.
7. Water.
8. Repairs.

(b) POWER EXPENSE — COAL		
Date	Description	Amount

(c) Tools—
9. Changes to small tools.
10. Insurance on small tools.
11. Taxes on small tools.
12. Changes to shop fixtures in tool storerooms.
13. Sundry tool expense.

(d) Rent—
14. Depreciation on buildings.
15. Changes to buildings.
16. Wages, watchmen.
17. Supplies for cleaning.
18. Telephone bills.

(e) Light—
19. Changes to illuminating system.
20. Waste and sundry supplies.
21. Repairs to illuminating system.
22. Wages of lamp trimmers.
23. Administration expense.

(f) Administration—
24. Salaries, superintendents.
25. Salaries, cost clerks.
26. Salaries, pay roll department.
27. Salaries, stenographers and typewriters.
28. Stationery.

MATERIAL EXPENSE.

(g) Raw Material—
29. Insurance on investment.
30. Salaries, inspection of raw material.
31. Salaries, raw stock keepers.
32. Salaries, porters (raw material).
33. Unclassified raw material expense.

(h) Process Material—
34. Salaries, general output department.
35. Salaries, counters.
36. Salaries, clerks (process stock).
37. Stationery.
38. Wrapping paper used on process stock.

The expenses are classified and a machine rate found as follows:

(a) Fixed Charges is a rate per $1 of the face value.

(b) Power Expense is so much per pound steam or K.W. hour.

(c) Tools Expense is analyzed and proportioned to each machine by estimate.

(d) Rent Expense is a rate per square foot.

(e) Light Expense is also a rate per square foot.

(f) Administration Expense is assessed according to the number of productive employes in the various departments.

Thus we can find the cost of running one machine for one year.

(a) Fixed Charges, — per cent. of face value .....——
(b) Power, — lbs. of steam at $— per lb. .....——
(c) Tools Expense for one year .....——
(d) Rent, $— foot at $— per square foot .....——
(e) Light $— foot at $— per square foot .....——
(f) Administration Expense $— per operator .....——
Total cost for one year.....——

Divide by the number of working hours in the year and we have the hourly machine rate.

Material Expense is handled in the same way, and is applied as a loading on material by using a percentage.

(b) POWER						
1906 January 4	5	6	7	8	9	Total
Purchase Summaries						
Shop Deliveries						
Journal Bills						
Journal Credits						

The bills are all classified according to the proper number when they come in, and are charged to the proper account. Thus a bill for coal would be classified (b) 4. Demurrage on coal barges would also be classified as (b) 4. Thus all charges of a similar nature are kept together.

As illustrated in Form 3 the Operator's Time Ticket is designed for entering the machine hours, and the class. The rate for the class is extended according to the number of hours worked and is added to the cost of the job in the following manner:

S. O. Order No.

STRAIGHT PIECEWORK TIME AND CREDIT TICKET		
To	Started	
Order No.	Finished	
Operator No	Name	
Total Credit	Price	Labor Total Hours
Date of Delivery	Labor Loading	
Department	Mach. Hours	Mach. Class No
Certified by		

The shop cost department have a book ruled as illustrated in Form 1. In this they enter the charges to the various accounts. This is checked in a summary book with the ledger, a page of which is illustrated in Form 2.

Material.
Material Loading.
Labor.
Machine Loading.
Standard Cost.

Thus the material and the expense is added

together by the shop cost department in finding the total cost of the order as delivered by the shop.

Since running the factory over or under time makes variations in the amount of expense added to the various jobs it is necessary to make a monthly current variation report. Then a percentage can be added or subtracted as the case may be to or from the standard cost and the current cost found.

The above machine unit system, the form of which I have merely suggested, cannot be used in connection with my name. However, I would be glad to entertain a proposition to write out in detail this system for your Home Study Course in Systematizing, if you would suggest the number of words you could use. It could be made a supplement to your booklet on Manufacturing Cost. Since you desire to make your course better nothing would add more to its practical utility than the exposition of this system which is used by a company in more than 20 different factories, covering 80 acres of floor space.—B.M. Magazine.

Standard Metals*

Blister Steel.

One of the numerous miscellaneous small processes of steel making is the manufacture of blister steel by what is known as the "cementation process." This consists of subjecting bars of iron imbedded in charcoal and enclosed in air tight vessels or compartments to a high heat for a long period. At the high temperature the iron bars "soak in" and absorb the carbon of the charcoal, thereby converting the iron into a high carbon steel. The surface of the bars at the end of the process is rough and blistered; hence the name. Blister steel is principally used for facing iron in such tools as hammers, anvils, and various blacksmith's tools on account of the special property it has for uniting with iron in welding.

Tool or Cast Steel.

This is the great steel of commerce, and as its use, like that of cast and wrought iron, is almost universal, it is unnecessary to dwell upon the details of its employment. It is made from blister steel, which is broken up into small pieces and carefully selected, melted in a plumbago crucible, then poured into cast-iron molds, forming bars, which are then hammered and rolled into the desired shapes and sizes for the market. The quality of this steel is regulated by the quality of iron used in its manufacture and the thoroughness with which it is worked under the hammer and in rolls.

Quality of Wrought Iron.

The quality of wrought iron is known by its fibre; that is, a good quality ought to stand a large amount of bending when cold, and when broken should show a fibrous structure. Should it break off short, after the manner of cast iron, it is evident that the iron is of poor quality. In testing iron in this manner it should not be nicked, as that produces crystallization.

The foregoing is the merest outline of the manufacture of iron and steel, no attempt having been made to examine into the many elaborate details of the processes. In the case of iron especially the processes are so many and so varied and are so continually presenting new phases that the knowledge and ingeniuty of the iron-master are continually taxed, and the manufacture of iron and steel is stamped as one of the most intricate and useful arts.

Malleable Iron Castings.

In another place we have explained the method used in the manufacture of wrought iron, which material is, in fact, malleable iron. This wrought iron is made mallaeble in the form of bars and is then forged on an anvil in the shape desired for use. But in the manufacture of malleable iron castings this process is reversed, the pig iron as it comes from the blast furnace being first cast in the form in which it is to be used, and afterwards made malleable. This, it will readily be seen, is a beautiful and radical departure from the original methods of making wrought iron, for by it the cast iron can be easily melted and cast in any complicated form desired and afterward made malleable, thus enabling the manufacturer to produce at much less cost articles equaling in quality and surpassing in complexity of design those made from forged wrought iron. Following is a brief description of this process:

After the castings are made they are packed in cast-iron pots, the space around the castings being filled with oxide of iron. Then the pots containing the castings are placed in a furnace and subjected to a strong heat, which has the effect of extracting the carbon from the castings. In the case of wrought iron this is done in the puddling process.

This method of manufacturing malleable iron was invented in America about fifty years ago, and the business has now grown to such large proportions that it is impossible to here enumerate the great variety of uses to which it is applied. The American manufacturers have always held an advanced position in this art, and have done more in the line of manufacturing than has been accomplished by all other countries combined.

Welding.

The property of welding is possessed by wrought iron and soft steel, whereby two separate bars or other pieces can be joined or united together under the influence of heat and pressure so as to form one continuous or coherent piece. The two metals mentioned are the only ones possessing this property.

The pieces to be joined are heated nearly white heat known as "welding heat," after which they are placed either closely together or one on top of the other, and by blows of a hammer or the squeezing effect of rolls or a power press, are forced into close union, making the two pieces substantially one. While to form a strong and substantial weld it is necessary, as just explained, to apply some pressure in order to force together all of the surface to be welded, it is interesting to note that these metals possess a strong tendency to unite or adhere to each other under a welding heat, as is shown by the fact that upon reaching this heat the pieces of metal will become welded together to a certain extent if allowed merely to touch each other, without the application of any pressure.

In a good weld the welded part should be as strong as any other part of the bar. To obtain this strength the ends of the bar to be welded are thickened by being hammered up, or "up-set," which allows the welding pressure to be applied without reducing the size at the weld to less than the size of the remainder of the bar. After being "up-set," the ends of the bars are also beveled, in order to get a liberal amount of surface to weld.

The blacksmith, in preparing two bars for welding, usually throws a little white sand or borax upon the two heated surfaces before they are brought together for welding. The purpose of this is to form a flux which, by the chemical combination of the sand or borax with such rust, scale or dirt, as may be upon the surfaces of the two bars, forms an easily fusible material which cleans the surfaces of the two bars just at the time they are ready to be joined.

It is only possible to weld together such steels as are very soft or contain a very small percentage of carbon. The hard steels such as tool steels, are not capable of being welded because of the large percentage of carbon which they contain. The purer the steel or iron the more easily it is welded. Hard steel and iron are welded, as in the case of axes and carpenters' chisels, where only the cutting edge is of steel and the other portions are of iron.

*From Standard Metals, a book written by R. T. Crane, for use as a text-book in manual training schools.

CEMENT WORKS POWER PLANT.

When the works of the Belleville Portland Cement Co. were built a few years ago an up-to-date centrally located power plant was part of the equipment by means of which the entire machinery was electrically operated. The power house was designed to give ample room for extra prime movers and generating units. Twice has it been found necessary to increase its capacity to provide for the increased ouput the growth of business necessitated. Although this firm have just completed an important increase a further extension is necessary. An Allis-Chalmers-Bullock engine type generator, 150 r.p.m. 60 cycle 3-phase of 440 volts direct connected to a Goldie-McCulloch engine together with a 25 k.w. 125 volts exciter has been set up and now running. Twenty-three induction motors, a car load of which have been shipped are part of the planned for extension. Another steam electric unit consisting of a Goldie-McCulloch engine direct connected to a 500 k.w. Allis-Chalmers direct connected to a 500 k.w. Allis-Chalmers-Bullock generator to run in parallel with those now running, are in the course of manufacture and will be installed as soon as completed together with a 25 k.w. exciter. The new induction motors to be distributed throughout the works include eight of 50 h.p., three of 30 h.p. and 12 of 10 h.p., all of Allis-Chalmers-Bullock manufacture. When finished this power plant will be one of the most complete of any in operation in connection with a cement works in Canada.

The Technical Graduate and the Manufacturing Company.*

By Chas. F. Scott.

Changes which have occurred in the lifetime of the young men of the present day surpass in many features those which have occurred during many centuries. The rate of progress, moreover, is an accelerating rate. The value of the manufactured products of the United States have doubled in value in less than twenty years. This is significant of a new order of things. Engineering is not only the basis of this material change, but it is also the underlying condition which has brought about the new political, economic, and social evolution. These facts are well known. They have come to be regarded as almost commonplace. It is important, however, that we realize their significance in order that we may better understand the present tendencies and anticipate the qualifications which the future engineer should possess.

Two institutions have grown up within the past few years, with which we are very intimately concerned. These are the technical school and the large manufacturing company. In engineering education the ideals, the methods and the facilities are all new. The engineering graduate is a new product. He is a new factor in the world's work.

Educational methods are not fixed and definite. They are vastly different from those of a generation ago, and the engineering educational methods of the near future may be quite different from those of to-day.

Relation Between Engineering and Manufacturing.

Closely related to this development in engineering education is that of the manufacturing company. In electrical engineering, in particular, the growth of the school and of the industry have had a close relationship. Each has been, to a greater or less degree, dependent upon and aided by the other. In the days of our fathers, manufacturing was carried on in a small way, usually one man was at the head of a given business, personally familiar with and directing its various departments. He devised processes, directed the manufacture and was his own sales agent. Modern manufacturing, however, is of a different kind. The various functions formerly performed by one man require the co-operation of many men in a single organization. Each is an expert, and altogether they act as a powerful unit.

Thus, co-operation—or the corporation—has become the modern method. It is the method, moreover, by which modern engineering is conducted. Enterprises, except those which are small or of a particular kind, cannot be conducted by a single individual. The co-laboration of many men is required for larger undertakings. Hence, the necessity of the engineer being able to work efficiently with others.

The large electrical manufacturing company is typical of modern manufacturing and business methods. It may be noted that the products of the electric companies which are now produced in values exceeding a hundred million dollars a year, would have had no market thirty years ago, as they would have been practically useless. The work of these companies, in general, is broad, in its scope; it includes invention, development, design, manufacture and erection, as well as the sales and the financial departments. To carry on this work such companies are divided into many departments. Technical men find their field in those departments which are concerned with engineering, either directly or indirectly, and, furthermore, the engineering training is found in many cases to be an excellent preparation for those engaged in more purely executive work.

Experience Necessary.

There was an old time idea that the theoretically trained young man was completely equipped for doing engineering work and that he was at fault if he was not immediately prepared to produce efficient results This view, however, is based upon several misconceptions. First of all is the relation between knowledge and experience. One may know this theory and his formulæ, but engineering problems are not abstract, they are concrete. They deal not merely with forces but with materials. One must know the constants of his materials and the uses of the products. These come from experience. The designer of apparatus must not only know the theoretical principles which are involved, but he must know the various qualities, electrical and mechanical, of the many materials which he must use. He must be familiar with the methods of using these materials and the manufacturing facilities which will ensure cheap and rapid production. He must be familiar with the service conditions so that he may design apparatus which will not only meet reliably the electrical and mechanical requirements of normal operation, but which will safely withstand the emergency conditions which are liable to arise. His apparatus must be adapted to the best class of men who will use it. It must work properly with the other apparatus in the system in which it is to be placed. It must, in short, meet commercial conditions in a manner which will prove acceptable to those who purchase it. A gain of a per cent. in efficiency or in regulation is of minor consequence if a machine has bad bearings which overheat. It follows, therefore, that even the designer, who has probably more to do with theory than those in any other department, has to be familiar with many other points besides his theory. Experience, creative imagination, foresight as to the effects of new combinations and new forms, good judgment, integrity, not only with people, but in dealing with facts, tact and the ability to get along comfortably and efficiently with other people, together with a goodly measure of all-round common sense, are qualities which must supplement the knowledge of formulæ in order to effect the best results.

Those who are engaged in testing departments, in inspection, in erection, as well as in the various departments of commercial engineering and sales, require in a large measure the same breadth of view and qualities which have just been enumerated.

The manufacturing companies have recognized that the man immediately from college requires a further training. He needs experience, a new point of view. Engineering apprenticeship courses are therefore arranged in which he may gain familiarity with manufacturing and testing operations and also, what is of scarcely less importance, an immediate knowledge and acquaintance with the working together of many men in a great organization.

Young men in college are devoting their energies to preparation for their life work. It behooves them to expand their efforts as efficiently as possible. They will do well first of all to learn fundamental principles, to gain theory not merely in the abstract but through their laboratory work to gain a concrete physical understanding of these principles. A knowledge of specific things such as particular kinds of apparatus or the characteristics of special materials used in manufacturing processes, is of less consequence. Practice changes; principles do not. The student must not emphasize knowledge as distinguished from training. Training, which enables him to use his knowledge, is of first consequence. The man who is trained in observation, whose logical and reasoning powers are alert, who is able thereby to efficiently apply the knowledge which he has, will probably be much more effective and successful than his companion who may know more but can do less. A skilful workman with poor tools can accomplish more than a mediocre workman with the best of tools. Many of those who select college graduates look for the successful leaders in student organizations rather than those who head their classes. The man who combines both kinds of leadership gives especial promise. Many students do not get this broader view of their work. They do not apply engineering methods to themselves. Each man may well consider himself as a machine, as something with which to produce results. He should study how he may produce the best results with the least effort. Many are already quite proficient insofar as the "least effort" is concerned. The real problem, however, is with reasonable effort to produce maximum output. It is probable that some who have seemingly expended but little effort have learned to work with greater efficiency than the plodders who have received better class-room reports but with a vastly greater expenditure of effort. The man who had learned to handle himself and to work efficiently has a vast advantage when he does apply himself. This is one reason why college grades do not give a true indication of future careers.

If students can take this larger, broader and more serious view of their work, giving attention to the understanding of principles rather than the knowledge of facts, and recognizing that the training in the use of their powers is of scarcely less importance than the acquisition of these powers, then the college graduate will become a more successful man both from his own standpoint and that of usefulness to others.

The Grand Trunk Railway Co., have during the present year, spent almost $7,000,000 on rolling stock, of this 60 passenger coaches account for $720,000; 100 engines for $1,500,000, and 5,200 freight cars for $4,420,000.

*Based on a lecture delivered at University of Wisconsin.

When Business Tires.

DONT'S ON THE WAY.

1. Don't be afraid to work, it is healthy physical and mental exercise.
2. Don't be afraid to hustle, be glad of the chance.
3. Don't be afraid of being turned down.
4. Don't be afraid to change a man's opinion, but be careful how you do it.
5. Don't be afraid of failure. Keep on though you fail a dozen times.
6. Don't be afraid of difficult undertakings. Be glad of the opportunity to show your metal.
7. Don't be afraid of honest competition. It's competition that makes success worth while.
8. Don't be afraid to do more than is required of you.
9. Don't be afraid that your efforts will not be appreciated.
10. Don't be afraid to play the game honestly. Honesty always wins out.
11. Don't be afraid to go out of the way to do a good turn for a friend.
12. Don't be afraid to begin at the bottom. It is the safest way to climb.
13. Don't be afraid to think out new ways. Originality is appreciated.
14. Don't be afraid to do your best. The best is none too good.
15. Don't be afraid to tell the truth. It is a part of your honor.
16. Don't be afraid to think before you act.
17. Don't be afraid to use your time to advantage. It is given you for that purpose.
18. Don't be afraid of imitators. Originality always bears a trade mark.
19. Don't be afraid to risk. The great successes are born of chance.
20. Don't be afraid to make your goods known.
21. Don't be afraid to admit when you are in the wrong.
22. Don't be afraid to obey. A man must learn to obey before he may hope to command.
23. Don't be afraid of experience. He is the best teacher.
24. Don't be afraid of pleasure. It is necessary for good work.
25. Don't be afraid of censure. We all need toning down as well as toning up.
26. Don't be afraid of rivals. Things may be crowded below, but there is always room on top.
27. Don't be afraid to fight against odds. Most things worth having are hard to get.
28. Don't be afraid to be polite at all times and under all circumstances. It is no disgrace to be called a gentleman.
29. Don't be afraid of rebuffs. This may be your employer's method of trying your grit.
30. Don't be afraid to trust your boss. Confidence is a necessary part of success.
31. Don't be afraid of overtaxing your strength. Work kills but few people.
32. Don't be afraid of utilising an opportunity unless you receive orders. Waiting often results in failure.
33. Don't be afraid to watch the successes of your house. The fact that you are in its employ makes you a part owner.
34. Don't be afraid to work out your salvation. Every man must work out his own destiny.
35. Don't be afraid to rest if your health demands it. A strong mind needs a healthy body.
36. Don't be afraid to forget your work at times. Your work will be the better for it.
37. Don't be afraid to relieve your boss of cares and worries when you can.
38. Don't be afraid to give your fellow workman a boost where you can. Generosity shows a man's character.
39. Don't be afraid of failures. They are often promises of future successes.
40. Don't be afraid of fear.—Farm Machinery.

VALUE OF FINE IDEALS.

One of the most important needs in life is to have fine ideals, for they are ruling agencies in determining one's career, whether it will be high or low. It makes no difference how well-appearing a man may be, how large his estate is, or how prominently he figures in public affairs, if his ideals are low, he is a low man, and he will only have his influence as a low man.

A writer says that "the law that one grows like his ruling ideals has long been known, but it has been rarely utilized." That is very true. And it accounts for much of the bad phases of public and social life. It has even become a fashion of practical life to sneer at ideals, as if they were mere chimeras floating in the mind, says the Ohio State Journal. But experience doesn't look at them that way. It regards them as practical forces that tend to raise or lower life to their own levels.

There was a man whose ideals were so mean, that he discounted everybody's virtues and merits. It was only necessary to speak kindly of a neighbor to elicit a grunt from him. He always saw the faults of people, never their virtues; and so his own life, which pretended to be so exalted, was a low, mean existence. It kept on until he actually looked mean. There will be no mistake about it—just see the man or woman who never does anything but find fault, never sees even the little goodness that is in others, whose thoughts, like the flies always alight on sores, and you will see one who really looks mean and who seems to be always slinking away behind the shadows of life.

High ideals do not hide things that are wrong. They see them more clearly than low ideals do, and fight them, too; but it is all with hope, and a high aim, and with that jocund spirit that sees God ruling the world. It is the lesson of life for young and old, in whatever situation one's career is cast, to develop in the thought beautiful ideals, for to them the life will come, close and near, as one is faithful to them.

There is a form of unkindness that some are apt to think is Christian, and that is when one adopts some form of belief, and then thinks down on others who do not align themselves with that idea. This is always destructive of high ideals; if for no other reason than that it ignores that charity which is always the habit of true souls. There is one right way in this world, and nobody has been in it for nineteen centuries; but many have been, and are, very close to it, and they have been those whose ideals illustrate that life.—New York Commercial.

LIFE A CENTURY AGO.

One hundred years ago a man could not take a ride on a steamboat.

He could not go from Washington to New York in five hours.

He had never seen an electric light or dreamed of an electric car.

He could not send a telegram.

He couldn't talk through the telephone, and he never heard of the hello girl.

He could not ride a bicycle.

He could not call in a stenographer and dictate a letter.

He had never received a typewritten communication.

He had never heard of the germ theory or worried over bacilli and bacteria.

He never looked pleasant before a photographer or had his picture taken.

He never heard a phonograph talk or saw a kinetoscope turn out a prize fight.

He never saw through a Webster's Unabridged Dictionary with the aid of a roentgen ray.

He had never taken a ride in an elevator.

He had never imagined such a thing as a typesetting machine or a typewriter.

He had never used anything but a wooden plow.

He had never seen his wife using a sewing machine.

He had never struck a match on his pants or anything else.

He couldn't take an anesthetic and have his leg cut off without feeling it.

He had never purchased a 10-cent magazine which would have been regarded as a miracle of art.

He could not buy a paper for a cent and learn everything that had happened the day before all over the world.

He had never seen a reaper or a self-binding harvester.

He had never crossed an iron bridge.—Exposition Gazette.

SOLDERING PASTE.

Soldering paste has come into extensive use in electrical work as a flux for soldering, says the Brass World. This has been brought about by the requirements of the electrical trade that in certain forms of soldering no acid shall be used. For soldering copper wires for electrical conductors, soldering paste is almost exclusively used. It has also entered other fields of soldering, particularly in instances where spattering and corrosion are objectionable. Soldering paste which is now used in the electrical trades consists of a mixture of a grease and chloride of zinc. The grease which is commonly used is a petroleum residue such as vaseline or petroleum jelly. Such a material is about right in consistency. The proportions which are used are as follows: Petroleum jelly, 1 pound; saturate solution chloride of zinc, 1 fluid ounce.

Twenty-Five Years Ago.

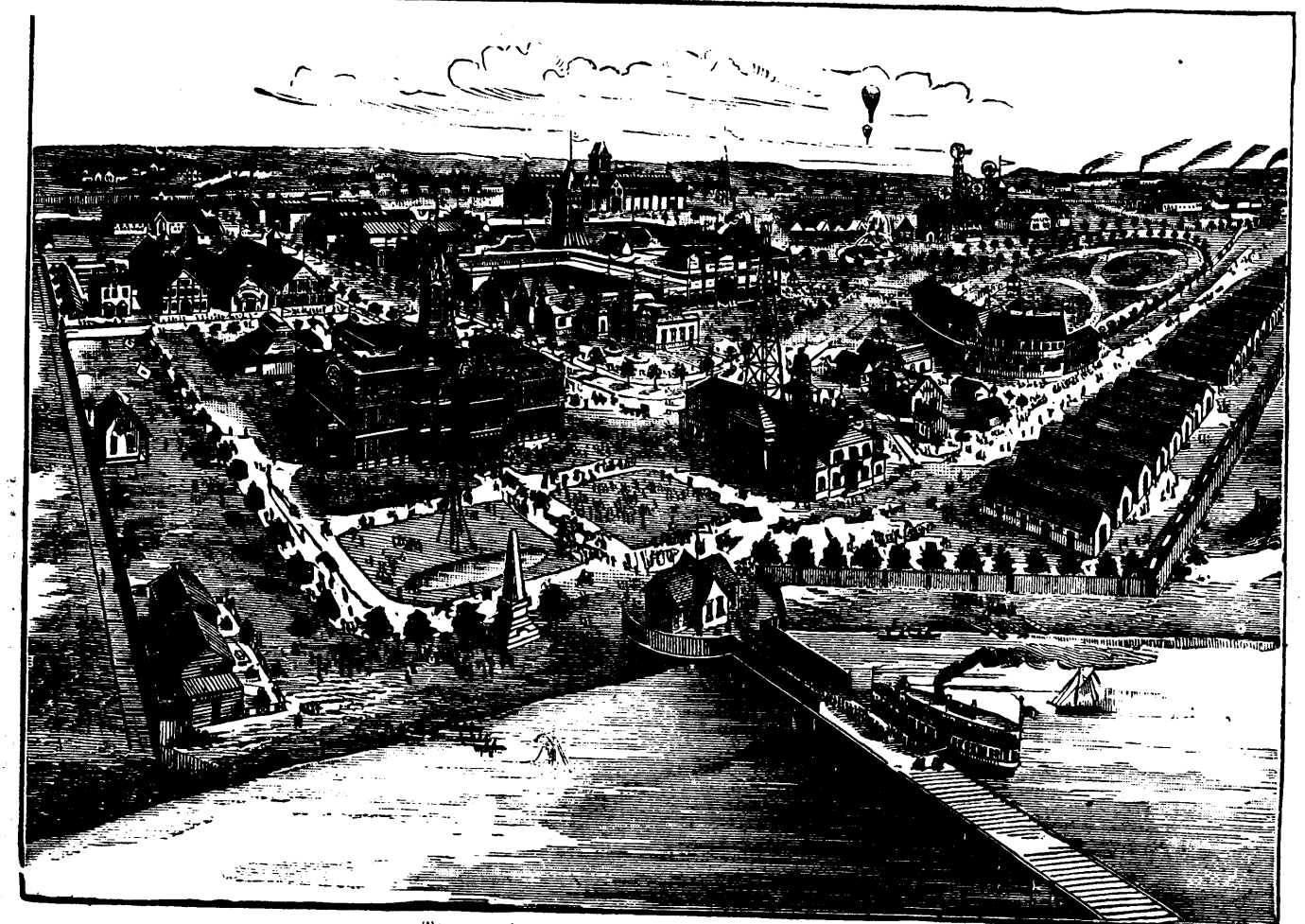
At this time a series of illustrated write-ups of Captains of Canadian Industry were running in the CANADIAN MANUFACTURER. Those illustrated in the issue of August 3, 1888, were Wm. Christie, biscuit manufacturer of Toronto, Robert Mitchell, head of the firm of Robert Mitchell & Co., brass founders, Montreal; Henry Bickford of the firm of S. Lennard, Sons & Bickford, proprietors of the Dundas Knitting Mills, Dundas, Ont., and James Kendrey, then manager of the Auburn Woolen Company's mills at Peterborough, Ont.

TORONTO INDUSTRIAL EXHIBITION.

The exhibition this year was under the generalship of John J. Withrow, the president. The exhibition opened on Monday, September 10, and lasted two weeks. The cost of buildings amounted to over $300,000.

The Toronto Exhibition has become one of the most important institutions in Canada certainly the most important of the kind; and a brief sketch of its history may be interesting. In 1877 a successful effort was made to induce the management of the Provincial Exhibition to hold its annual fair in Toronto. At that time there were no grounds in the city specially adapted for the purpose, no such fair ever having been held here, and application for a portion of the garrison common was refused. A second application was also refused; whereupon the city council appointed a deputation of influential citizens to go to Ottawa and lay the matter before the Government. They went, and their request was granted, and the land now occupied by the association was appropriated for the purpose. The sum of $150,000 was needed for the purpose of preparing the grounds and erecting suitable buildings and conveniences; and a by-law authorizing the issue of debentures for the amount by the city was submitted to the voters and unfortunately lost. Another by-law voting $75,000 was then submitted and lost, whereupon the city council included $100,000 in the estimates for that year (1878), and the exhibition became an assured success. This action was taken only about three months before the proposed opening of the exhibition, and during that time the grounds had to be fenced, graded, drained and ornamented, and the buildings erected; and it is enough to say that at the appointed time the opening was duly performed by the then Governor-General, Lord Dufferin, in September, 1878, and under the circumstances this exposition was gratifyingly successful.

The accompanying illustration shows the Toronto Exhibition grounds in 1888, and the striking contrast between then and to-day would be at once apparent.



TORONTO INDUSTRIAL EXHIBITION GROUNDS—1888.

The foundry of the Jenckes Machine Co., Sherbrooke, Que., was destroyed by fire July 30.

The Canadian Pacific Railway Co., will erect a large roundhouse, car wheel foundry and repair shops at Fort William, Ont.

The McClary Mfg. Co., London, Ont., have purchased the plant and machinery of the Burn & Robinson tin stamping works, Hamilton.

Mr. H. W. Petrie, Brantford, Ont., recently shipped a large quantity of wood-working machinery to Liverpool, N.S., to be used in a large shipbuilding establishment there.

The John Doty Engine Co., Toronto, built the four-horse power Otto silent gas engine recently placed in the new works of the Ever Ready Dress Stay Co., Windsor, Ont.

The Montreal Car Wheel Co., of Montreal, have been incorporated with a capital of $25,000, for the purpose of manufacturing car wheels. The incorporators are George Edward Drummond, James Tod McCall, Thomas Joseph Drummond and William Frederick Ritchie, of Montreal, and Richard Schott, steel manufacturer, of Sheffield, England.

The Nova Scotia Steel Co., New Glasgow, N.S., are applying for supplementary letters patent increasing their capital stock from $300,000 to $1,000,000, and extending their power so as to enable the company to manufacture steel and iron in all their branches, and articles consisting of iron and steel, in whole or in part; and changing the name to Nova Scotia Steel & Forge Co., Limited.

MACHINERY AND EQUIPMENT FOR SALE

BUILDERS' SUPPLIES

OUR SPECIALTIES — LIME, CEMENT, sewer pipe, plaster Paris, fire brick and fire clay. ONTARIO LIME ASSOCIATION, 118 Esplanade Street East, Toronto.

EDUCATIONAL

ELLIOTT BUSINESS COLLEGE, corner of Yonge and Alexander Streets, Toronto, ranks higher than the average college; students admitted at any time; advantages unsurpassed; graduates highly successful, catalogue free.

PRINTING

THE COMMERCIAL PRESS, 47 Lombard Street, Toronto, make a specialty of commercial printing Circulars, Letter Heads, Statements, Etc. Good printing adds to the efficiency of any circular.

INDUSTRIAL CENTRES

NIAGARA AND CATARACT POWER gives Welland cheapest electric lighting in Canada; manufacturers investigate our power, lake shipping and five railways. Write Board of Trade, Welland.

PORT DOVER, ONTARIO—In the natural gas belt; immense quantities of gas for manufacturing purposes at low rates. Has best sheltered harbor on north shore of Lake Erie, directly opposite Erie, Pa. South terminus of two branches of Grand Trunk; other railways building. Cheap coal and cheap electrical power. Good clay, sand, and limestone. Address W. K. Gordon, Secretary Board of Trade, Port Dover, Ont.

COVERINGS AND INSULATION

MICA FIREPROOF COVERINGS—Highest insulator of heat known. For boilers, flues, furnaces, steam and hot or cold water pipes, cold storage, sound insulation. Mica Boiler Covering Co., 86 to 92 Ann St., Montreal.

BOILERS AND ENGINES

BOILERS.—For special quotations on boilers and sheet iron work, write Park Bros., Chatham, Ont.

RUBBER STAMPS

B. CAIRNS, 77 QUEEN STREET EAST, Toronto—Rubber Stamps, Seals, Name Plates, Stencils.

SCRAP METALS, PAPER, ETC.

E. PULLAN, TORONTO, positively the largest dealer in paper stock in the Dominion. Also buys rags, iron, metals, etc. Corner Adelaide and Maud. Phone Main 4626, Toronto.

SITUATIONS WANTED

Electrical Engineer with 11 years practical, theoretical and central station experience, 30 years of age, at the present time Chief Assistant Engineer to lighting and traction authority in England, seeks change. Would like similar position in Canada or charge of large contract work. Experienced in every branch, excellent references. Associate Member of Institute of Electrical Engineers. W. H. Stamp, 11 Somerset Place, Devonport, England.

SPECIAL MACHINERY

GENERAL MACHINE WORK and repairing; special machinery. The Eccles & Hae Machine Co., machinists, 816 Bathurst Street, Toronto.

PATENT RIGHTS FOR SALE.

LICENSES FOR SALE OR BRUSHES SUPPLIED under Canadian Patent No. 92,652, Sectional Hair Brush, the only hygienic hair brush known.

Apply to Thomas S. Crane, 70 Nassau Street, New York, N. Y.

FACTORY FOR SALE

NEW BRICK FACTORY, three floors, 48 by 96, two acres land, Cowansville, Que.; private siding C.P.R.; power, exempt from taxation, water free. Geo. J. Crombie, 74 St. Antoine St., Montreal.

TYPEWRITERS FOR SALE

SMITH PREMIER TYPEWRITER FOR sale, newly rebuilt, price $50.00, guaranteed for two years, splendid value, will be sent on approval. National Typewriter Co., Limited, 78 Victoria Street, Toronto.

FOR SALE

FOR SALE—Automatic Stoker, with fan and engine complete, in good running order. Snap. Reason for selling, compelled to burn shavings. Apply A. J. H. Eckhardt, National Casket Co., 107 Niagara Street, Toronto.

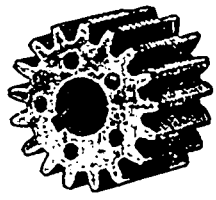
PLANS WANTED

CITY OF WOODSTOCK — PRELIMINARY competitive plans for a new City Hall for the City of Woodstock are invited. Cost of building, $50,000. For all information apply to John Morrison, City Clerk, Woodstock, Ont.

SALESMAN WANTED

WANTED—High-grade steam specialty salesmen who have the ability to sell the best economic appliances on the market direct to power plants. No objection to men handling non-competitive goods. Extremely attractive proposition. Goods well-known and of highest reputation. Address, "Steam Specialty," care of CANADIAN MANUFACTURER, McKinnon Bldg., Toronto.

WANTED— Aggressive salesmen calling on manufacturers in Maritime Provinces, to carry side line. Good commission. Address CANADIAN MANUFACTURER, McKinnon Bldg., Toronto.



FACTORY LOCATIONS.

The following Canadian municipalities are offering inducements to secure manufacturing establishments. Inquiries should be addressed to the Mayor, Town Clerk or Board of Trade of the respective cities

Barrie, Ont.
Hamilton, Ont.
Peterborough, Ont.
Regina, N.W.T.
Sherbrooke, Que.

NOTICE The following are the Factory Inspectors for the Province of Ontario:

JAS. T. BURKE, Parliament Buildings, Toronto.
THOMAS KEILTY, Parliament Buildings, Toronto.
ARTHUR W. HOLMES, Parliament Buildings, Toronto.
JOHN ARGUE, Parliament Buildings, Toronto.
MARGARET CARLYLE, Parliament Buildings, Toronto.
MRS. JAS R. BROWN, Parliament Buildings, Toronto.

I ersons having business with any of the Inspectors will find them at the above address. HON. NELSON MONTEITH, Minister of Agriculture.

INDEX TO ADVERTISEMENTS.

ifc ..... inside front cover. ibc.....inside back cover obc.....outside back cover.

INDEX TO ADVERTISEMENTS (Continued).