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
- ☑ Showthrough/ 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
									✓		

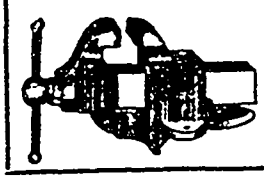
Pages Missing

Have you noticed the increase of advertising in THE CANADIAN MANUFACTURER? This is only one of several ways in which this paper has "made good" in the last year or two.

PURCHASING AGENTS' DIRECTORY

This department has been started to bring together those who have to sell specialties for the factory, mill or foundry and these buyers who are "in the market" for such lines. Readers of this paper will find this department one of the most useful features of the paper. Mention the paper when you make enquiries of advertisers.

Vises



VISES
Bench Vises
Drill Vises
Miller Vises
Pattern Makers Vises
Get Our Prices.
The Stevens Mfg. Co., Limited
GALT, ONT.

Engraving and Die-Sinking

TORONTO STAMP & STENCIL WORKS, Ltd.
(I. C. FELL & CO.)
Rubber and Steel Stamps
Seals and Brands. Memorial Brasses.
Door Plates.
137 Church Street, - TORONTO

Buyers' Guide

CANADIAN
INDUSTRIAL BLUE BOOK
Has advantages as a Buyer, and the Addresses of Manufacturers for the Seller.
THE MANUFACTURERS LIST CO.
P.O. Box 334, Toronto

Files and Rasps

R. SPENCE & CO.
HAMILTON, ONT.
FILE and RASP MANUFACTURERS
AND RE-CUTTERS.
A trial order solicited. Write for terms.
C. P. MOORE, PROPRIETOR.

Gears

RAWHIDE GEARS
MANUFACTURED BY
THE HORSBURGH & SCOTT CO.
Cleveland, Ohio.

Rails

JOHN J. GARTSHORE
88 Front St. W., Toronto.
Rails and SUPPLIES,
New and Secondhand.
For RAILWAYS, TRAMWAYS, Etc.
Old material bought and sold.

Foundry Supplies

THE WELDING PROCESS FOR THE FOUNDRYMEN
Gives liquid steel at 5100° F. anywhere in half a minute.
Write for booklet.
Goldschmidt Thermit Co.
334 St. James St., Montreal

Rivets and Steel Products

The PARMENTER & BULLOCH CO., Ltd.
GANANOQUE, ONT.
Iron and Copper Rivets, Iron and Copper Burrs, Bifurcated and Tubular Rivets, Wire Nails, Copper and Steel Boat and Canoe Nails, Escutcheon Pins, Leather Shoe and Overshoe Buckles, Bit Braces, Felloe Plates.

Paper

WM. BARBER & BROS.
Georgetown, Ont.
Manufacturers of . . .
Book and Fine Papers

Furnace Cement

STERNE'S ASBESTOS FURNACE CEMENT
Is the most efficient, economical and durable on the market.
Every pound guaranteed.
Get our quotations
G. F. STERNE & SONS,
Brantford, Ont.

Hack Saws

Cuts Bars 6 x 6 Inch Round or Square
Needs no attention after work is flat in vise.
Automatic stop when piece is cut off.
Improved arm keeps saw perfectly in line at all times. Get Prices.
D. McKenzie, Guelph, Ont.

Paper

THE.....
Toronto Paper Manufacturing Co.,
Cornwall, Ont.
Manufacturers of Engine Sized Superfine Papers, White and Tinted Book Papers, Blue and Cream Laid and Wove Foolscaps, Account, Envelope and Lithographic Papers, etc.

Office Furniture

Scales

FYFE'S STANDARD
HAY, COAL AND WAGON **SCALES**
Warranted Superior Quality.
498 St. Paul St., MONTREAL

Writing Paper

The ROLLAND PAPER CO.
HIGH GRADE PAPER MAKERS
Makers of
"Superfine Linen Record"
"Earnscliffe Linen Bond"
"Empire Linen Bond"
"Colonial Bond"
Grand Prix, Paris, 1900.
QUEBEC MONTREAL TORONTO

Paints and Varnishes

THE CANADA PAINT CO.,
Limited
OIL CRUSHERS, LEAD GRINDERS
Color Manufacturers, Varnish Makers
Montreal Toronto Winnipeg

Lubricating Oils and Greases

WHALE OILS
Economic Oils and Greases will cut your Lubricating Account in two. Try them.
Canadian Economic Lubricant Co., Ltd.
Manufacturers of High-Grade Lubricating Oils and Greases.
23 to 29 Wellington Street, MONTREAL.
Refiners of Cold Test Neatsfoot and Whale Oils.

Galvanizing

PROFESSIONAL DIRECTORY

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

The Cost of Power in Ontario.

EXTRACTS FROM THE REPORT BY THE HYDRO-ELECTRIC POWER COMMISSION OF ONTARIO ON THE COST OF POWER PRODUCTION THROUGH THE AGENCY OF PRODUCER GAS PLANTS AND OTHER PRIME MOVERS UNDER THE CONDITIONS OBTAINING IN THE PROVINCE OF ONTARIO.

Part I.—General Conditions Affecting the Cost of Power.

In preparing this Report on the cost of power in the Province of Ontario, two considerations have led to the needs and requirements of the small consumer being specially kept in view. Firstly: Because as a whole, the small consumers probably use a larger amount of power than any other class of power users; and secondly, because every large power proposition is a problem in itself, and is therefore unsuited to the treatment necessary in a general report.

In considering this Report, it should be borne in mind that power is as much a manufactured commodity as any of the articles usually so described, and that the real cost of power to the consumer includes the cost of the raw material, an allowance to cover the cost of the machinery used in its manufacture, the cost of the labor expended on it, as well as the cost of transporting the power from the point at which the finished product is turned out (viz., at the engine shaft as B.H.P.), to the place where it is used.

This being a report on the costs of generating power, the costs shown in these estimates do not provide for its transmission, and the question of transmission is only referred to in order that a correct conclusion may be reached when the costs of power manufactured by the prime movers here considered are compared with the cost of other power, such as Hydro-Electric power, which includes in its price the cost of transmitting it and delivering it in a form suitable for use or further transmission.

CAPITAL COSTS.

The capital costs of the power installations as shown in these estimates are believed to be fair average costs applicable to power installations for manufacturing purposes, and the working expenses for an installation which is efficiently maintained, supervised and operated The necessary plant to produce the power specified in some cases could doubtless be obtained at a less capital cost, but the result would usually be a less reliable service and greater operating cost. On the other hand a more reliable service and a smaller operating cost could be obtained by a larger capital expenditure and consequent increase in the fixed charges.

The choice of plant to be installed for power production and the cost of installing and operating it depends on local conditions to an extent which makes it impossible to provide a general estimate which is likely to satisfactorily meet any specific proposition. The type of plant will differ with the situation in which it has to be installed, with the work required of it as well as the conditions under which the work has to be done. Price of fuel, price of labor, facility of water supply will also have a definite bearing on the plant chosen and for the same type the capital costs will vary according to the excellence and completeness of the plant installed, and these will again have an influence on working costs. The most expensive type of plant to install is a pressure or down draft producer gas plant,* followed in order of cost by suction gas plants, steam plants, oil engines for use of kerosene oil, and gasoline engines; the cheapest being a gas engine for use with natural or illuminating gas. It is noted that producer gas plants are comparatively new, and their costs have latterly been materially reduced, and there remains the possibility of some further reduction in this direction.

The capital cost per B.H.P. installed will vary with the size of unit employed, larger units of the same type costing less per B.H.P. than smaller units. Generally speaking the units should be installed in the largest sizes that will admit of individual engines working at high load factors both to save in the capital cost of the unit itself and also in accessories such as land, buildings, boilers and condensing plant. These large units work more economically than smaller ones, and there is a saving not only in capital costs, but in fixed charges and working expenses.

Good quality in the plant will increase capital costs and consequently interest charges, but the total of the fixed charges will not be materially altered on this account as the increased interest charges will be compensated for by the less rate of depreciation and less cost of repairs, and in addition the user will obtain a more reliable service. The saving due to good quality of the plant will principally appear in the working charges owing to the smaller consumption of fuel and water, and less labor required.

FIXED CHARGES.

The items taken to make up the fixed charges on the plant have probably been placed at a lower figure than conservative practice would dictate. It is doubtful if money to meet capital expenditure could to-day be obtained at 5% and so far as depreciation on producers and gas engines is concerned they have not been in existence long enough to enable a definite opinion to be given. In the estimates their depreciation has been figured as that of a steam engine and boiler, although it is quite common practice to figure depreciation 1% higher in the case of gas plants, than in the case of equivalent steam plants. On the other hand it is doubtful if many power users, particularly small power users, have any change made in the amount of their insurance or assessment, on account of their plant, although an allowance for such has been included under fixed charges in the estimates.

* Editor's Note.—Under present money conditions 7% would be a fairer charge for capital expenditure This would work out to the advantage of gasoline engines, steam plants, etc., as compared with suction or producer gas plants.

WORKING EXPENSES.

Working expenses consist principally of the cost of labor and fuel. In the case of small plants which do not require the whole of one man's time, it is impossible to make a general allowance for labor costs, which will satisfy all cases, and, as in small plants of some types the cost of labor is the largest item in the cost of power, the choice of the type of plant to install will largely rest on the arrangements that can be made to employ the spare time of the attendant on other work.

In the estimates for installations of small units, it has been considered that some such arrangement can be made and only part of the time of an attendant has been charged to power production. If, however, the power user's circumstances are such that the time of the attendant cannot be divided between the plant and other work, and the whole of his wages have to be charged to power production, the cost of power will considerably exceed that given in the estimate. It is partly for these reasons that in small plants the cost of power produced by gas, gasoline or oil engines is less than steam and producer gas plants, which, although they work with less fuel costs, require more labor, which more than offsets the saving in fuel.

FUEL COSTS.

In large plants the position is reversed and the cost of fuel becomes more important than the cost of labor, and the proper choice of fuel for use in the plant is essential for economic working, and with some types, particularly producer gas plants, it is essential to working at all. Although the value of coal to a power user depends on the heat units it contains it is seldom that this point is considered in purchasing it Experiments recently made show that a steam plant required 3.66 lbs. of a coal averaging 13,621 heat units per pound to produce an electrical horse power hour, while an expenditure of 5.08 lbs. of coal averaging 11,151 heat units per pound was required to produce a similar result in the same plant working under slightly more favorable conditions.

Where coal is brought from a considerable distance, as it is in Ontario, it is usualy advisable to use the grade of coal having the largest heat value per pound At the mine the difference in heat values of two otherwise similar grades of coal may enable the mine owner to sell the coal having the largest heat value at a higher price, but the principal factor in the cost of coal to the user is the cost of transportation, and the difference in cost at the mine is only a small fraction of the total cost when delivered, therefore the question of the heat value of the coal used as well as the price becomes important in selecing the grade, and merits more attention than is usually bestowed on it.

A comparison of the relative costs of producing power by the agency of vari-

ous prime movers is often made on the basis of fuel costs only and usually on the assumption that the power plant will have an engine load factor of 100%. Such comparisons are usually misleading and always unworthy of consideration by a power user who desires to obtain his power service at the least total cost.

Many small plants designed to have a low fuel consumption are so expensive in first cost or require so much labor to operate, that a cheaper and simpler plant will produce power at a less total cost, although its fuel costs are comparatively large.

For example, a workshop requiring 10 B.H.P. as a maximum, and working 10 hours a day, with an average engine load factor of 50% will get its power for about 4.07 cts. per B.H.P. hour with a suction gas plant and 3.53 cts. per B.H.P. hour with a gas engine using illuminating gas, although the cost of coal for the suction gas plant would only be 0.42 cts. against a cost of 2.25 cts. for the illuminating gas used in the gas engine. With a larger plant the conditions might be reversed. Thus, if the above workshops required 30 B.H.P. as a maximum, under the same conditions of load, the suction gas plant would deliver a B.H.P. hour at a total cost of 2.25 cts. against 2.82 cts. for an engine using illuminating gas, although the fuel cost would remain about the same, viz., 0.39 cts. and 2.03 cts. respectively. From this it will be seen that general statements regarding the cost of fuel for a particular type are not a sufficient basis on which to determine the plant to use.

The estimated costs of power, although comparable among themselves, being all on the same basis are not directly comparable with the cost of electric power sold on a meter basis. The cost of electric power at the meter or other point of delivery includes also the cost of transformation from brake horse-power to electrical horse-power and the cost of transformation from brake horse-power to electrical horse-power and the cost of its transmission.

Therefore, in comparing the cost of power at the engine shaft, as given in the estimates, with electric power, bought as such, an addition to the cost per B.H.P. must be made to obtain the equivalent value of an E.H.P. This addition will usually be about 15%, as for this amount the power user could install the necessary electrical machinery and turn out his power in the form of electricity.

Savings in Transmission.

Unfortunately there is often a confusion of ideas which leads the power user to credit electricity as a means of obtaining power with the advantages which rightly belong to electricity as a means of transmitting power.

It is commonly stated that, owing to the saving of transmission losses in in the shafts and belting, electric power will reduce the total power consumption of a factory to one-half the power required with steam power, and the conclusion is drawn that the power user would be justified in paying nearly twice as much per E. H. P. hour for electric power as he would per B.H.P. for steam power.

This conclusion is in no way justified. If the power user installed a single electric motor to take the place of his steam engine, the power loss in the factory on account of transmission through the shafts and belts would remain the same, and the electric motor in delivering the same B.H.P. as the steam engine would require a greater E.H.P. at the meter, and would be more expensive. There is, therefore, no saving to the power user in using electric power where steam, gas or other power costs about the same, unless he alters his method of transmitting and using the power.

Only 15%, Not 50%.

Should he wish to obtain the advantages of electricity for the transmission of the power in his factory and avoid the losses due to belts and shafting, he can do so by installing an electric generator in his own engine room, driven by his own engine, and obtain the same saving in transmission that he would obtain with bought electric power. An electric horse power obtained from his own plant would then cost him about 15% more than a B.H.P. similarly obtained, and therefore, he is only justified in paying about 15% more for an E.H.P. than a B.H.P. instead of double, as often claimed.

This point is of considerable importance in discussing comparative power costs and cannot be neglected without vitiating the conclusions reached.

Time Power is Used.

The cost of power has been calculated on the basis of a year of 3,000 working hours equivalent to 300 days of 10 hours each, and a year of 6,600 working hours, equivalent to 300 days of 22 hours each, and for the plant working at various load factors. The year of 3,000 hours may be taken to represent fairly accurately the conditions in the average factory working from 7 a.m. to 6 p.m. with a noon interval of an hour.

The year of 6,600 hours will represent approximately the conditions obtaining in a factory which works day and night. The actual cost of power given in the estimate will usually be found low when compared with any specific proposition, because for the purpose of calculation it has been necessary to assume that there is the same load on the machinery day and night, a condition that could obtain in but few cases. Furthermore, no allowance has been made for spare machinery in the estimates. This, in nearly every case, would be a necessity in order to prevent the inconvenience and loss that would be incurred from shut downs if it were attempted to run the plant for 24 hours a day, and the fixed charges on this spare plant would materially increase the cost of power as given in the estimates.

Part II.—Producer Gas Plants.

In Ontario the field for producer gas plants for power production purposes will be found largely in those industries which do not use steam for heating or industrial purposes, and which require power in medium quantities or require gas for brazing, annealing or tempering, or which have to work under drastic smoke nuisance by-laws. Within these somewhat narrow limits natural gas and Hydro-electric power are likely to be its only serious competitors. From the power users' point of view, the saving in capital cost, reliability of operation, and simplicity of working obtainable from natural gas or hydro-electric power will allow these to enter into effective competition with producer plants, even when the cost of power so obtained is in excess of the cost of power developed by means of producer gas.

Suction or Producer.

The situation of Ontario with regard to its coal supply and the present state of the art of designing producers for use with ordinary bituminous coal render it probable, for a considerable time to come, that the demand for producer gas plants will be met by the suction type using anthracite coal. Pressure or down-draft producers using bituminous coal are in successful operation in many places where it has been economically advisable to install them owing to the wide margin that obtains between the price of anthracite and bituminous coal or the very large size of the plant making the recovery of by-products from the gasification of bituminous coal profitable. These producers for bituminous coal are more complicated than suction producers and, requiring a steam boiler working under pressure, combine many of the objectionable features of steam plants with those of gas plants. These types use considerably more fuel than suction plants to accomplish the same useful work, require more supervision, and give less reliable service. To compensate for these disadvantages requires a greater margin between the cost of anthracite and bituminous coal than usually obtains in Ontario. In the future pressure and down-draft producers will probably obtain their fullest development either in utilizing low grade fuels too poor in quality to be burnt under a boiler and too low in heat value to bear the cost of distant transportation in competition with better grade coals, or in countries where coal and wood are expensive and the only source of power. That is to say, under conditions which do not and are not likely to obtain in Ontario.

Pressure and down-draft producers, using the smaller sizes of anthracite, such as buckwheat and rice are in operation, and make a gas more suitable for use in an engine than those using bituminous coal, but the other objections to the use of these producers remain.

For instance, the National Board of Fire Underwriters require all pressure producer plants to be installed in a separate building, but this rule does not apply to suction producer plants until they are 250 H.P. and over.

An exception to the statement that a suction producer using anthracite is most suitable for use in Ontario may be made in the case of a manufacturer who has wood scrap as waste from his factory. It may so happen that this waste cannot be advantageousl sold and is insufficient in quantity to produce the necessary power if burnt under a boiler. In such a case a producer using wood instead of coal might enable him to obtain his power from his waste

product. Producers using wood instead of coal can be satisfactorily operated, but are not in general use, as under ordinary circumstances coal is sufficiently cheap to displace wood.

Suction Producers.

Suction producers can be worked on anthracite of pea size as usually sold in Ontario, and this grade has been used for the purposes of estimate. As it appears there is no standard specification for this grade of anthracite; the pea grade of some coal operators may be no better than smaller sized grades of other operators, and care must be taken that the pea grade of the local market is of suitable size and cleanness or the suction plant will not operate satisfactorily.

Good quality coke or charcoal will give as satisfactory a service as anthracite in suction producers, but will probably require 15% to 20% more by weight and a consequent increase in capital costs due to the larger producer required.

The principal merits of producer gas for power production are a small fuel consumption and for the present the absence of restrictive regulations such as apply to steam plants, and in some special cases the absence of smoke in working. The absence of restrictive regulations is not so much due to the inherent safety of this type of plant as to the lack of data on which to frame satisfactory regulations. The increasing number of accidents due to the poisonous and insidious nature of the gas generated is, however, leading to the formation and enforcement of such regulations, and with the increasing number of plants brought into use it is altogether probable that in time a trained and certified attendant will be as necessary in a gas plant as he now is in a steam plant.

Comparison with Steam Engine.

Compared with the steam engine or the electric motor the gas engine and, indeed, all internal combustion engines have the serious defect of having practically no capacity to take overloads or loads above their economic rating A steam engine and an electric motor can be designed to run most economically at a certain loading, and to take care of considerably greater loads for long periods of time, although at a lessened efficiency, which enables variable loads and over-loads to be handled with economy and a satisfactory service maintained With the gas or any internal combustion engine its economic load is practically its maximum load, and its capacity to handle over-loads is very small It therefore follows that with variable loads a gas engine has to have a capacity sufficient to handle maximum loads, although running the greater part of the time at an uneconomic loading.

Thus in a plant having an average load of 100 B.H.P., but occasionally reaching a maximum of 125 B.H.P., a steam engine of 100 B.H.P. would suffice, whereas a gas engine of 125 B.H.P. would be required to handle it satisfactorily If a gas engine of 100 B.H.P. was installed to deal with a load of this sort, it would stop when the maximum load came on. This basic difference in the two types of engines should not be overlooked in comparing them. For non-fluctuating loads such as pumping into a reservoir they are fairly comparable on the basis of the power developed at their economic loading, but on a rapidly fluctuating load such as obtains in street railway work a gas engine of 125 or possibly 150 B.H.P. rating would be required to handle the same work that a 100 B.H.P. steam engine could easily take care of.

Difficulties in Operation.

Similar to this inability of the gas engine to satisfactorily handle overloads is its inability to start under a load, a failing which handicaps it considerably for certain classes of work, such as textile mill work, if the engine is conected directly to the shafting.

In many gas plants difficulties in starting, either from the engine refusing to start at all or starting in a backward direction, are so frequent as to cause considerable annoyance. The neglect of minor repairs and adjustments which in a steam engine would only result in a larger coal consumption while it continued to give the required service will in the case of a gas engine result in the engine refusing to work at all, a result which will also occur in producer plants if inattention to the producer causes any considerable variation in the quality of gas produced.

A considerable number of producer gas plants have been installed which have failed to give satisfaction, and which in some cases have been superseded by steam plants or electric power. These failures are usually due to one of the following causes :—

1. The power consumer being persuaded to install a producer gas plant where this type is unsuited to the conditions of working.

2. Failure of the selling agents to have the plant properly erected and satisfactorily put to work before handing it over to the purchaser.

3. Failure of the selling agents and puchaser to arrange to have the attendant properly trained to work the producer plant before he is left in charge. It is practically impossible for an untrained man to run a producer plant satisfactorily.

4. Failure to obtain a suitable grade of coal for use in the producer.

5. The power user often buys the cheapest plant offered without reference to its reliability or efficiency, or he attempts to run his plant on the cheapest coal or with the cheapest labor.

6. Companies with no experience in producer or gas engine work take contracts for installing plant which they have never before manufactured or experimented with. Their experiments are then carried on at the expense of the purchaser, usually to his dissatisfaction.

Although the producer gas plant has not been long in commercial existence in this country as compared with other prime movers, there is no reason to anticipate that satisfactory results cannot be obtained with it where it is used within its proper limits. To insure these results, it is necessary that a producer plant be suited to the conditions under which it works, that the type is selected and the plant installed under the supervision of a competent person independent of the selling agents, and that a trained man be placed in charge of it.

Almost every case of unsatisfactory service can be traced to a failure to observe one or the other of these rules. Unfortunately these requirements are more often more honored in breach than in observance and in practice the result is that producer gas plants have not substantiated the claims which their advocates have made for them.

A power-user to-day would not be justified in investing in a producer gas plant unless the estimated saving in the total cost of power was sufficient to compensate him for an unreliable service. The producer gas plant, compared to the steam plant is new, and the later plants give a more reliable service than the original types, so that in the future if may be anticipated that a type of producer gas plant will be evolved which will admit of comparison with the steam engine or electric motor on the basis of reliability under ordinary working conditions. An examination of a large number of plants for the purpose of this report has shown that the average reliability of the producer gas plant at present is not sufficient to admit of any comparison with that of the steam engine or electric motor.

Part III.—Steam Plants.

The use of heat in many manufacturing processes and the necessity of heating buildings during a long winter, will in a large number of cases leave steam power in possession of the power field in Ontario even when its cost, referred to a power basis only, is in excess of the cost of power generated in producer gas plants or of Hydro-electric power.

It is often stated that a steam plant using its exhaust steam for heating purposes supplies the heating without cost or vice versa This is not entirely correct, as the power consumer to use his exhaust steam for heating has to forego the advantages that would be obtained by using condensers and thus either reducing his steam and fuel consumption or increasing the capacity of his plant. The value that these advantages would be to him is the cost of his heating, and although less than the cost that would be incurred by installing a separate heating system is yet sufficiently large to merit attention.

Use of Steam for Heating.

Taking the case of a steam plant with compound engines of 100 B.H.P. working condensing during the summer and using the whole of the exhaust steam for five months of the year for heating purposes, the fuel costs would be somewhat as follows, assuming the factory worked with an average load factor of 50%.

Using the exhaust steam for heating five months a year :—

Coal required for 1,250 hrs. work, engines non-condensing and using 7 lbs. * coal per B.H.P hour ...	437,500 lbs
Coal required for 1,750 hrs. work, engines condensed and using 5¾ lbs. coal per B.H.P. hour	503,125 "
Total coal used per annum	940,62.. "

* ½ lb. coal extra on account of back pressure in the steam heating system.

If however, the engines were worked condensing the whole year and the boilers bled for steam for heating through a reducing valve directly into the steam heating system then the fuel expended would be :

Coal required for power purposes only for 3,000 hrs. per year, with the engines working condensing and using 5¾ lbs. coal per B.H.P. hour	862,500 lbs.
Coal required for heating purposes for 1,250 hours (the coal used being 85% * of the amount before used for five months as above)	371,875 lbs.
Total coal used for heat and power purposes..	1,234,375 "

Showing a saving of 293,750 lbs. of fuel in favor of using the exhaust steam for heating purposes, or a saving of about 24% of the fuel costs. The total saving will be larger than this by the amount which will cover attendance and fixed charges on a boiler for steam heating.

If in order to use the steam for heating purposes in winter only no condensing plant was installed, and the engine worked non-condensing throughout the year, for this purpose, then the saving would be smaller, amounting to only about 13.5% of the fuel cost instead of 24%.

COMPARISON WITH PRODUCER PLANTS.

Comparing the cost of power and heating considered together for a non-condensing steam engine as shown in the estimates and a producer gas plant with separate heating system, both of 100 B.H.P. and a 50% load factor.

Cost of power for 3,000 hours steam plant using the exhaust steam for heating...		$3,858.00
Cost of similar power from a producer gas plant	$2,446.65	
Cost of fuel for steam heating, 371,875 lbs., at $3.25 per ton	604.30	
Allowance for attendance, fixed charges, etc., on boiler for steam heating	450.00	
		$3,500.95
Saving in favor of producer plant		$ 357.05

or about 9% of the yearly charges for steam power, an amount which is considered insufficient to compensate the average steam user for the inherent disadvantages of a producer gas plant and even this small monetary advantage would be decreased if the steam plant used a condenser during the summer months. **

In small plants where the steam engines installed are usually uneconomical in steam consumption, producer gas plants will appear more favorably than they do in the above example, but as the majority of factories using steam for heating have plants of at least 100 B.H.P. it may be accepted that with the present prices of coal the producer gas plant will not be able to compete seriously with steam plants where the exhaust steam is used for manufacturing or heating purposes, even where the engines are worked non-condensing for the whole year.

In large plants, especially those which have to deal with fluctuating loads, and which do not require steam for heating purposes, the steam turbine will enter into close competition with producer gas plants when considered on the basis of the total cost of power. The steam turbine plants will have the advantage, when considered on the basis of either capital costs or reliability of service. This case of the cost of power generation is not taken up in detail in this report as the station would be so large that it would be quite exceptional in Ontario.

As a general rule and so long as the present prices of coal do not materially increase, the steam-driven plant may be expected to hold its present position, except in competition with cheap natural gas or hydro-electric power, in all cases where the exhaust steam can be used for heating or manufacturing purposes and in all power propositions of medium size or above, where a fluctuating load has to be taken care of. In plants requiring heat, natural gas and hydro-electric power will begin to compete with steam when the cost of power obtained by their agency is so low as to show sufficient savings over steam power to enable a separate heating system to be economically installed and worked, and under other conditions where heating is not an important question, when the costs based on B.H.P. are equal.

ESTIMATES SHOWING THE COSTS OF INSTALLING AND WORKING STEAM PLANTS

Note 1. The estimates are not for plant of any particular make, but represent the average cost of a plant suitable for manufacturing purposes. No spare plant has been allowed.

2. It has been assumed that the water can either be obtained at a nominal cost or can be used in some other part of the factory, and therefore only a small allowance has been made for cooling water in the condensers.

3. Surface condensers have been assumed for the purpose of estimate. Jet or ejector condensers, if the conditions admitted their use would cheapen the capital cost of the installation.

4. No estimates have been prepared for steam turbines, as it has been considered that they are only likely to be suitable under present conditions in a small number of cases where a large amount of power is required.

5. Working costs have been based on the assumption of fairly steady loads and intelligent supervision. If the load fluctuates, fuel consumption and costs will increase, even though the average load remains the same. Unless skilled supervision is obtained, working costs will be considerably increased

6. The plants of medium size and above it will usually be more satisfactory to provide two or more smaller units rather than one large unit.

Part IV.—Oil and Gasoline Engines and Engines Using Illuminating or Natural Gas.

Power users who require power in small amounts as for workshop purposes or for short times at irregular intervals, as for agricultural purposes, will find their wants best supplied by small engines of the internal combustion type using coal oil, gasoline or gas, which require little or no labor in handling or preparation.

Although the fuel these engines use is of a somewhat expensive nature, their small capital cost and the little attention they need in working more than offset it, and their facility of starting without requiring a long time for preparation makes them especially suited to the requirements of power producers, who only require to use power occasionally.

Where gas is obtainable the gas engine will usually be found to give the most satisfactory service with the least first cost. Where gas is not available the choice will be between an engine using coal oil and an engine using gasoline.

Although the gasoline engine is somewhat cheaper in first cost the oil engine is deserving of more attention than it usually obtains, as it gives as efficient a service as the gasoline engine with a less cost for fuel and uses a fuel which is more easily obtained. The insurance regulations which are stringent as to the use and storage of gasoline do not place the same restrictions on the use of coal oil.

Gas engines can be obtained up to any size likely to be required, and in many places where natural gas is obtainable, will generate power more cheaply and more satisfactorily than engines using producer gas.

Estimates are given for gas engines using natural gas of 980 B.T.U. per c. f., which enquiry shows is sold in Hamilton at 20 cts. per 1,000 c. f., and nearer the wells could doubtless be obtained cheaper.

Although not estimated for in this report the alcohol engine will in the future occupy a place, so far as cost of power is concerned, between the gas engine using natural gas and the gas engine using illuminating gas. Nearly all countries at present impose a heavy tax on the manufacture of alcohol, even when it is to be used for industrial purposes. The high price of alcohol due to this tax has prevented the alcohol engine being economically used, and has retarded its development. With the removal of this tax on alcohol for industrial purposes; and legislation to effect this has been introduced or is about to be introduced, in many countries, alcohol will be reduced to a fraction of its present price, and the practically unlimited supply of alcohol that can be obtained at a low cost by the distillation of wood waste, corn stalks, etc., will permit of the alcohol engine taking a position in industrial life at least as important as that to-day occupied by the gas, gasoline and oil engine.

* 15% is allowed for condensation losses in the piping and cylinder losses which do not occur when the steam is taken directly from the boiler.

** (Note.—A comparison of this kind tends somewhat to a comparison on a full consumption basis.)

Part V.—General Conclusions Regarding the Power Sit 'ation in Ontario.

Fuel Supply.

The crucial point in any general discussion of the conditions governing the economic generation of power in Ontario will always be the cost of fuel supply.

Petroleum and Natural Gas.

Excluding hydraulic power, coal is the only fuel likely to permanently enable the power demands of a large manufacturing community to be satisfactorily met. Petroleum is not found in sufficiently large quantities to meet the demands of both light and power users, and in the competition for its use the light user, being able to pay more for it, will ultimately fix the price above that which the power user can economically pay.

Where the local demand for natural gas for lighting and domestic purposes is insufficient to utilize the whole product of the wells, it may become of considerable value to the manufacturer for power purposes as natural gas cannot be stored and transported like petroleum.

Unfortunately there is no certainty that the supply of natural gas in any locality will be permanent, or even sufficiently long continued to make it advisable to put in a large plant which is solely dependent upon natural gas as its source of power, although when close to the wells, this is probably the cheapest source of power that can be obtained. Plants using natural gas as a fuel under boilers and in gas engines are to-day in operation, but are so arranged that they can be worked with coal or producer gas whenever the wells show signs of becoming exhausted, and in considering natural gas as a source of power, this contingency should not be overlooked.

Wood for Fuel.

Wood is becoming too expensive to be used to any appreciable extent as a fuel, more especially in the more settled portions of the province where power is most largely required.

Absence of Local Sources of Coal Supply.

Up to the present, the absence of local sources of coal supply in the province has rendered the power user dependent on the coal fields of the United States for his fuel. The increased and increasing demand there for coal has reached a point where the question of the exhaustion of the present sources of supply of the better grades of coal is already a matter of some concern, and in conjunction with other factors, has enabled the coal owners to increase prices until to-day the price of coal used, in one specific case in Toronto, is about 45% higher than it was eleven years ago, and now stands at a price 9% above the average price of the past eleven years, even including in this average the high prices obtained a few years ago during the coal famine.

No grounds can be seen for anticipating that this increase in the price of coal will not continue, and as the coal becomes dearer the producer gas plant, will compete more and more successfully with the steam-driven plant, even in those industries that require steam for heating. Were it not for the existence of large water powers in the province it might be confidently predicted that in the future the producer gas plant, as it developed and its reliability increased, would be as common in Ontario as the steam plant is to-day, and the steam plant as rare as the gas plant.

Water Power.

The water powers of the province, if properly conserved, are sufficient to supply the local power demands beyond any period in the future that can be intelligently anticipated at present, and are so distributed as to enable practically the whole province to obtain by electrical distribution the advantages of hydro-electric power without having to pay an excessive charge for its transmission. These water powers which are to-day valuable will become much more valuable as the price of coal increases, and if controlled and developed so that hydro-electric power is sold at a price based on the cost of development and transmission, and not at a price based on the cost of power generated by the next dearer means available, they will go far towards mitigating the effects of an increasing price of coal. Assuming that they will be so controlled, the conditions which make it possible for the producer gas plant to displace the steam driven plant will also operate at least as strongly towards the displacement of the producer gas plant by hydro-electric power. An increase in the price of coal will make it relatively cheaper to produce power by means of a producer gas plant than by means of a steam plant, but it will make the power produced by either a steam or gas plant more expensive than it is now, and consequently will increase the areas within which hydro-electric power will give a cheaper power service than power produced from coal used either in steam or producer gas plants.

Hydro-Electric Power.

As hydro-electric power can only be economically transmitted over large areas when considerable blocks of power are dealt with, it may be expected that the producer gas plant will in many cases occupy a transitory position between steam and hydro-electric power, while the power demands of an area are reaching a size that will make the transmission of the nearest hydro-electric power economically possible. In making any comparisons between the cost of hydro-electric power and power locally generated, the cost of a B.H.P. shown in these estimates should be increased about 15% in order to obtain the equivalent cost to the power user of an E.H.P. The figure thus obtained, as it includes an allowance for interest on capital and depreciation, will only hold good for comparisons in the case of new power installations. In making comparisons with a view to arriving at the figure at which hydro-electric power will be able to compete with power from installations already in existence it is necessary to consider that fixed charges on account of capital have already been incurred and must be provided for, and the deciding point will be whether the cost of hydro-electric power will be less than present operating expenses. If it is not then the power consumer will probably wait until large alterations or a new plant are necessary before he will use hydro-electric power. Furthermore, the figures in the estimates submitted for a basis of comparison are only average figures, and where the cost of transmitting hydro-electric power makes it equivalent to the cost of power as shown, it will not displace all the power used in the area considered, but only in cases where the cost of the locally-generated power is above the average. In such cases probably two-thirds to three-fourths of the total power developed in any area will be costing more than the figures given in the estimates, as the power plants will include a number which are obsolete or working under unfavorable conditions, whereas the estimates are for up-to-date plants working under favorable conditions. When hydro-electric power can be sold at a price, say 10% below the operating expenses for locally generated power as calculated in this report, it may be expected that the hydro-electric power will displace practically all other power.

For installations using steam for heating or other purposes, hydro-electric power must be sold at a cost of 10% to 25% below the cost of steam power as shown in the tables according as the exhaust steam is used part of the year for heating or the whole year for manufacturing purposes. The exact calculation would be to add 15% to the cost of a B.H.P. as shown in the estimates and deduct the cost that would be incurred in providing steam from a separate source for heating or manufacturing purposes.

When it appears that the cost of power from any one source as compared with another will be approximately the same, the case must be dealt with on its merits as a specific proposition, outside the scope of this report, which is, and only can be, applicable to the general average cost of power production in the province.

Summary of Conclusions.

The main result of this study of the conditions affecting or likely to affect the cost of generating power in Ontario may be shortly summarized as follows:

1. Users of small amounts of power will be best served by electric power where it can be obtained at a price per E.H.P. not exceeding by more than 10% to 25% the cost per B.H.P. of power developed by gas, gasoline or oil engines. If electric power is not obtainable their wants will be most satisfactorily met by means of a small gas, gasoline or oil engine.

2. Users of large amounts of power where the load fluctuates will be justified in paying for electric power 30% more than the cost per B.H.P. if obtained from one of the prime movers shown in the estimates. If they cannot get electric power, steam power will give them the most satisfactory service.

3. Power users who require steam for heating purposes will only be justified in paying for electric power per E.H.P. a price equivalent to 80% to 85% of the cost of steam power per B.H.P., as shown in these estimates. If it cannot be obtained for this they will be best served by a steam engine.

4. Where the cost of producer gas power per B.H.P. does not work out 15%

below the cost of hydro-electric power per E.H.P., it will be advisable to use hydro-electric power. Producer gas plants at present are only advisable for those power users having a fairly steady load and who require fairly large quantities of power, or who use gas for other purposes, such as annealing, brazing, or who may anticipate trouble from smoke-nuisance by-laws. In the future the increasing price of coal in Ontario will probably allow producer gas plants to successfully compete with steam plants, even in those cases where the exhaust steam could have been used for heating and manufacturing purposes this increase in the price of coal will also, however, extend the areas over which hydro-electric power can be profitably distributed, and the producer gas plant will probably only occupy an intermediary position in the displacement of steam by hydro-electric power.

5. Natural gas in some parts of the province, may, for a time, enable power to be produced cheaper than from any other source. The lack of permanence of the natural gas supply will not, however, justify a power user in sinking any considerable capital in a power plant to use natural gas unless when the supply is exhausted he can continue to produce power with producer gas cheaper than by any other means.

6. The value of the water powers of the province to the province as a whole depends on their conservation and development along lines which will require the selling price of hydro-electric power to be based on the cost of its development and transmission and not on the cost of generating power by some other agency to compete with it.

Conditions and Prospects of British Trade in Canada.

A Review of Report by Mr. Richard Grigg, Special Commissioner of the British Board of Trade.

FROM THE CHAMBER OF COMMERCE JOURNAL—*(Continued from February 21st issue).*

In his report on "British Trade in Canada," Mr. Richard Grigg deals with particular branches of trade as follows:

Textiles.—Under the head of woollen, cotton and silk goods the total imports into Canada in 1906 amounted to $42,546,982, as against $30,125,933 in 1902, an increase of 41.2 per cent. Deducting raw silk and cotton from the total imports and from the United States contribution to them, the share of the United Kingdom in the total trade was 71.1 per cent., the United States contributing 12.3 per cent.

Woollens.—The United Kingdom practically rules the Canadian market in woollen goods, sending in 1906 no less than $15,743,322 worth out of a total of $19,381,666. There is a considerable Canadian production of woollen blankets and rugs, the balance being obtained from the United Kingdom. Flannels are all Canadian, except scarlet, white, cream, and Saxony (which are all British), and a line of French flannel. All wool and union blankets run in weight from 5 lb to 8 lb., the 7 lb. weight being the most popular, because of being double-bed size. The grey union blanket runs in price from 25 cents to 40 cents per lb.; white, all wool, from 40 to 75 cents per lb. (both wholesale). In white, all wool, the 8 lb. size is most popular. The cheapest blanket is in demand in Western Canada for miners, ranchers, camping purposes, etc. In men's clothing an interesting development is the great increase in ready-made clothes, with a very wide range of sizes and qualities. The British share of the imports of carpets in 1906 was $1,871,301 out of $2,174,275, thus holding the great bulk of the trade, but in five years the Canadian production increased by 43 per cent. Of hosiery, knit goods and underwear ($1,781,792 in 1906), the United Kingdom supplied 84 per cent. in 1906. Coarse worsted hosiery and knitted underwear goods are largely produced in Canada, but cashmere hosiery, fancy knitted goods and coarse honeycomb shawls are nearly all British, on grounds both of price and quality. The hats and caps chiefly worn in Canada are of felt and tweed respectively. The trade is divided between the United Kingdom and United States, the former's share having increased of late years, and so long as British firms can supply their present quality and the desired style there should be nothing but progress for them in the Canadian market. In 1906 the total imports of hats and caps (beaver, silk or felt), was $1,301,864, of which the United Kingdom supplied $698,073 and the United States $564,478. The figures for straw, grass or chip hats were $935,086, of which the United Kingdom supplied $357,654 and the United States $520,935.

Cotton Goods.—The total imports of cotton and manufactures thereof were $18,371,831 in 1906, of which $7,626,625 was for cotton wool and raw cotton (practically all from the United States). The United Kingdom contributed $6,90[illegible]104 of the total. In laces British houses are sending samples and representatives more freely than formerly, the market being chiefly supplied by the United Kingdom with a considerable quantity from Germany and some fine Valenciennes from France. The total value of imports under this head in 1906 was $1,704,692, of which $1,011,486 came from the United Kingdom. Hosiery was imported in 1906 to the value of $314,368, of which $155,869 came from Germany and $127,760 from the United Kingdom. Cashmere hosiery is nearly all British; fine grades of cotton hosiery are obtained from Germany, whilst the coarser grades are all Canadian; coarse worsted hosiery goods are all Canadian, but the fine goods are British. Fancy knitted goods are all British; honeycomb shawls of fine grades are German and the coarse grades are British. In curtains and shams, Nottingham leads and is maintaining the trade. The highest class of goods are obtained from Switzerland. In ribbons (silk and cotton) there has been a decline in British imports, and a rapid increase in those from Switzerland: in 1906 the total imports were $1,157,886, of which $456,872 came from the United Kingdom, $343,219 from Switzerland, and $212,662 from France. The Swiss have the bulk of the trade in white cotton embroideries. The total imports of gloves and mitts amounted in 1906 to $1,'67,091, of which $436,233 came from the United Kingdom, $341,739 from France, and $168,660 from Germany. Knitted gloves are drawn chiefly from the United Kingdom, cashmere from Germany, and kid from France. Frillings, ruchings, etc., are largely made in Canada, children's bibs, veilings, etc., being chiefly British; while haberdashery is chiefly of British and German origin. Of dress goods and silks venetian and broadcloth are largely French all wool cashmeres, henriettas, satin cloths silk colienne, crepe de chine, are chiefly French and are in large demand; silk and wool poplins, tweeds and worsted goods are chiefly British; velveteens and silk face velvets are British; and cheviots generally French. In clothing the total imports in 1906 were $672,673 of cotton and $[illegible]4,535 of silk, the United Kingdom supplying $248,645 and $169,676 respectively. British manufacturers get a large percentage of the trade in printed goods and muslins, but part of better grades comes from France. Cotton batiste or grass lawn is obtained from the United States in considerable quantities. Cambrics of lower grade are of Canadian manufacture, whilst the better goods are entirely British. Cottonettes, tickings, drills, heavy shirtings are chiefly Canadian, lighter shirtings, madras, etc., are mainly British. Dress ginghams of the lower numbers are Canadian, but the better numbers are British; apron gingham is of late largely British, owing to the great width (40 inches) now required, and the difficulty of producing it in Canada. Indian linen, Persian and lawn, are chiefly British. White sheeting has of late been coming in larger proportions from the United Kingdom, owing to the great demand and inability of the Canadian mills to meet it. White lawn of the lower grades is now produced in Canada, but the better grades are still British. In plain colored sateens (cotton) Canadian manufacturers are gaining more of the trade and now have the greater part of it; formerly it was British. Canadians demand soft, but heavy goods with less dressings, and British makers fail to meet the exact demand. British firms can compete in white and grey shirting of medium and low qualities, but not in the cheap. The goods must be heavy and not stiff. White and bleached cottons now come largely from the United Kingdom; grey cottons are chiefly Canadian.

Silk.—The total imports of silk and manufactures thereof were $4,793,485 [illegible] which the United Kingdom supplied $932,340. The British imports (principally fabrics and velvets) have remained [illegible] those from Germany have declined [illegible]

from all other sources have increased. Swiss silks are receiving a good deal of attention, and silk taffeta is being introduced in growing quantities.

Linen and Jute.—Under the heading of flax, hemp and jute and manufactures thereof, the total imports of 1906 were $5,212,231. The United Kingdom has a commanding position in this trade, her share of the imports being 87.8 per cent., the United States holding 13.4 per cent. (much being undressed hemp), and the British East Indies 12.7 per cent. The imports of cordage, rope and twine were $2,013,091 of which binder twine constituted 80 per cent., entirely from the United States. A large proportion of the cordage is obtained from the United Kingdom.

Metals and Manufactures Thereof.

The total imports under the head of metals, minerals and manufactures thereof amounted in 1906 to nearly $60,000,000, of which the share of the United Kingdom was only $11,296,000 (19 per cent.) and that of the United States $45,744,000 (77 per cent.)

Mining Machinery.—Nearly the whole of the mining machinery comes from the United States, and there is also a considerable Canadian manufacture. Pumps come largely from the United States, as also do wrought iron pipe and rails. Wire ropes are bought largely in the United Kingdom, as well as lattice cloth, explosives, screening plants and air compressors. Various useful hints are given in the report with a view to increasing British trade in this class of machinery.

Hardware.—The total imports of general builders' hardware were $751,859 in 1906, served almost solely from the United States, the British share being only $81,046. There is a considerable production of these goods in Canada. The demand for padlocks is large; tool chests and cupboard locks of brass are made cheaper in Germany than in England; British door locks (mortice and rim) are generally unsuitable, being too heavy and the keys too large. There is a small import of stoves, fire grates and fenders, and the British import could be substantially increased by careful investigation of local conditions on the part of the makers. The following goods are all obtained from the United States or Canada itself:—Carriage bolts, nuts, wood screws, locks, knobs, latches, brass wire, copper wire, iron wire, galvanized wire, files, rasps, butt hinges, hollow-ware (cast or wrought), enamelled ware, galvanized pails, chain, trace chain, chest handles, horse clippers, hair clippers, iron ladles, coachbers' ladles, fry pans, grass hooks, scythes, irons, sash lines, sash weights, tug chains, vises, screw drivers, planes, nail hammers, brass and iron chisels, saws and nearly all kinds of house furnishing hardware, including tools of nearly all descriptions. Sash lifts, fasteners, cupboard catches, barrel bolts are of British, common, japanned. In bolts and nuts the British manufacturer will not adapt threads to the American standard. Coil chain was imported largely from the United Kingdom, but is now coming in increasing quantities from the States. The better quality hollow ware comes from the United Kingdom, but the cheaper qualities, so largely used, come from the United States and Germany. Various hints are given in the report as to packing, advertising and freightage.

Tools and implements.—The total imports of tools and implements (including adzes cleavers, hatchets, wedges, sledges, hammers, crowbars, cart dogs and track tools, picks, mattocks, axes, files, rasps, etc.) in 1906 were $1,438,028, practically all coming from the United States, the British share being only $81,300. Edge tools are now made in Canada and the United States, British prices being too high; iron planes come solely from the United States; harvest tools are made largely in Canada, and not imported at all from the United Kingdom; shears and trimmers are of American origin; British saws have been almost entirely supplanted by American manufacturers; British files are said to be rough and warped, and not so good as the American, and in carpenters' tools there is no British trade whatever. British tools are said to be too heavy, but if manufacturers would produce goods suitable to the market a large trade could be done.

Cutlery.—The share of the United Kingdom in this trade is by far the largest, and has increased very rapidly in the last five years, whilst the German advance has been comparatively small, although it is alleged that in some cases German manufactured go into Canada as British. German razors have entirely displaced the Sheffield article, and the sale of German pocket knives has largely increased. The scissor trade is almost entirely in the hands of German and United States manufacturers, and tailors' shears, steel faced and with cast malleable handles, are made solely in the United States, and sold at $8.50 per pair.

Structural Iron and Steel—is purchased chiefly from the United States, as architects are accustomed to American standards, and British standards do not meet Canadian requirements.

Steel Bridges are purchased mainly from the United States, prices being lower than the British.

Railway Materials.—Railway spikes are cheaper in America than in England, while the reverse is the case in respect of track bolts and fish plates. As to plates for fire boxes, it is said that these cannot be obtained from the United Kingdom of the requisite size and thickness, and that British prices for plates are too high. In axles and tires the competition is chiefly from Germany, and heavy machine tools are obtained in part from the United Kingdom. The demand for steel rails is very fluctuating, and in normal times would be fully met by Canadian production, but were it not for the Canadian dumping clause the United States supply would swamp the market.

Plates.—As to plates, it is urged that British makers, to obtain a larger share of the trade, must adopt United States methods, roll more true to gauge, and to a large extent abandon their extra list.

Galvanized Iron.—In this line, though the British preponderance is still maintained, there has been a rapid increase in the proportion of the trade taken by the United States.

Black Sheet Iron is also obtained from the United Kingdom, but the United States have lately sent this iron and Canada plates and tin plates, and the quality of their goods is excellent.

Tubes come almost entirely from the United States. There is a large market for tubes for heating purposes. All iron pipe must conform to United States standards in size and pitch of thread and weight per foot.

Locomotives.—The whole of the supplies of locomotives are obtained from the United States, there being no likelihood of the British being able to do very much in this market, partly on geographical grounds.

Wire fencing practically all comes from the United States.

Agricultural machinery.—This trade is almost entirely taken by the United States, and there is a very large production in the Dominion.

Bicycles.—The bicycles in use have spring handle-bars and back pedaling brake only, with coaster hub. The tires are generally Dunlop detachable and the total weight from 25 to 26 lb. complete. Retail prices are about $35 without the coaster brake, and $65 for first-grade machines complete. The British bicycle is not popular, chiefly beacuse it is too heavy.

Brass and Copper.—Of brass and manufactures thereof, the total imports in 1906 were $1,938,169, and copper $3,102,736, of which the share of the United Kingdom was $238,438 and $42,000 respectively.

To Make Paper Waterproof.

From Power.

Waterproofed paper makes excellent packing for certain purposes. An exchange gives a process for waterproofing paper, as follows: Articles of paper or cellulose are soaked in a solution of resin soap, then immersed in a hot bath of zinc chloride, passed between rollers, well washed, dried in a hot room treated with paraffin oil, and run through a calender. A waterproof pasteboard is secured by immersing sheets of ordinary paper in a bath of nitric acid, or solution, placing the sheets one on top of another, and then submitting them to heavy pressure.

Customs returns for the port of Toronto for the fiscal year ending March 31, show an increase of $2,947,496 over the returns of the same date, 1907 The total duty collected during March was $868,893, an increase of $234,833 over the figures of the same month last year.

The Canadian Pacific Railway have been authorized to construct bridges at or near the following points on their system: Lethbridge, Alta.; Carpenter Creek, B.C.; Mission Branch, B.C.; Bala, Ont.; Thames River, Ont.; Embro, Ont.; Brockville, Ont., and Badger Creek, Man.

The R. Durack Estate, Montreal, will erect a five story office building at 373 Craig Street West. Each floor will have an area of 3,210 sq. ft., and the building is to be completed by September.

Use of Tackle for Hoisting and Dragging.

By F. W. Brady.

Those who have to use blocks and ropes when erecting machinery and buildings sometimes become confused regarding the arrangement of them in order to get the best results. The rule relating to a pair of blocks carrying one or more pulleys, and using a single rope looped through them is as follows:

The weight that can be lifted equals the pull on the free end of the rope multiplied by the number of strands of rope extending from the movable block.

Thus, in Fig. 1, which shows the common form of blocks and ropes, the fixed block A is that attached to the support. The movable block B is that attached to the load or weight, and it is moved by means of a pull applied to the free end C of the rope. The blocks in Fig. 1 have three pulleys each, and when in the position illustrated there are six ropes extending from the movable pulley B; that is, if the movable block B were cut off by passing a blade along the line marked E F, six ropes would be severed. According to the rule then, 100 pounds pull at C would balance 100x6=600 pounds at W. This is the theoretical balance, no allowance being made for the friction of the pulleys and strands of the rope. Moreover, it does not make any difference what direction the free end C takes after leaving the last pulley on the fixed block A. The weight balanced per unit pull at C will be the same at any of the positions shown by the dotted lines G and H. It will be noticed in this arrangement that the fixed end K of the rope is attached to the fixed block A.

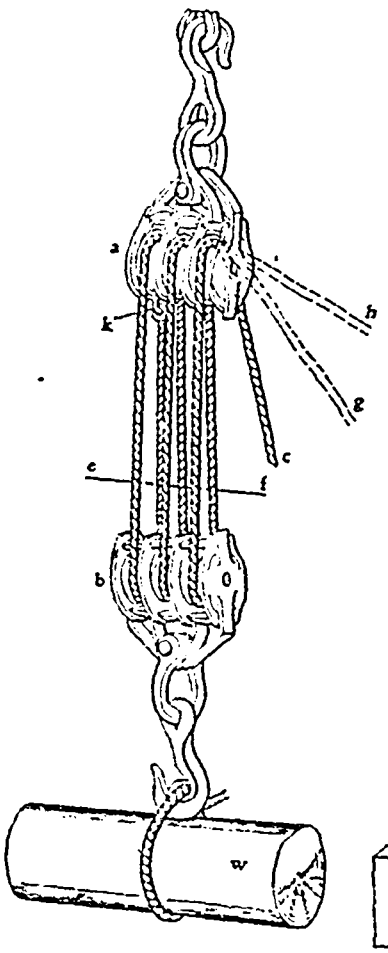


FIG. 1

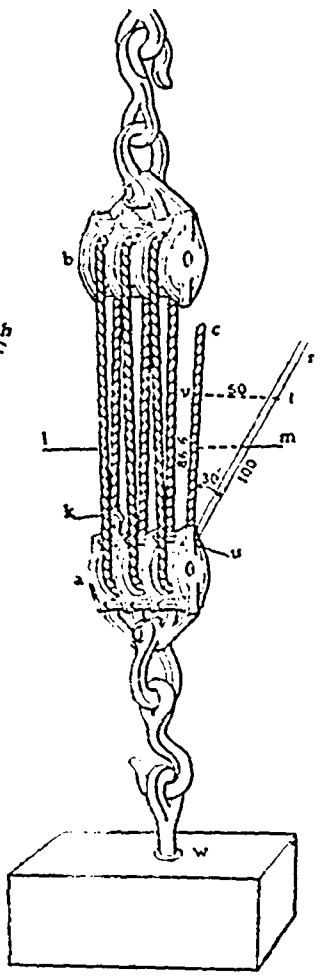


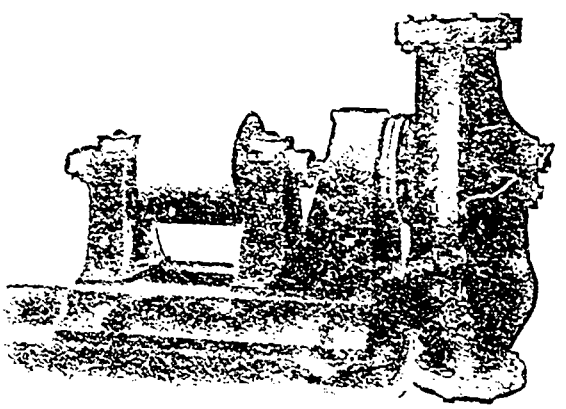
FIG. 2

Now, invert the outfit as shown in Fig. 2, using the same blocks and number of pulleys and loops of rope, and the relation between the pull and the weight balanced is different from that shown in Fig. 1. In Fig. 2 the fixed end K of the rope is attached to the movable block A, and in order to cut off the movable block by passing a blade along the dotted line l m, seven ropes would be severed. In this case, then, 100 pounds pull at C would [illegible] 100x7=700 pounds at W, and the arrangement is more advantageous than that shown in Fig. 1. In many cases, not only for direct hoisting, but especially for dragging heavy machinery from the car, or into position on the foundations, the method shown in Fig. 2 should be used.

The rule if applied to Fig 2 [illegible] that all the strands of the rope are parallel. If the free end to which the pull is applied is not parallel with the other strands, then a correction must be made. Thus, suppose the free end has the direction of the line marked R of Fig. 2, the angle with the parallel ropes being 30 degrees. Complete the triangle of forces shown at T U V. The amount of weight balanced by the pull will then equal to the amount of pull at the free end multiplied by the number of parallel strands leading from the movable block, plus that portion of the pull at the free end represented by the line U V in the triangle of forces. For a pull of 100 pounds, the six parallel ropes will balance 6x100=600 pounds. In the triangle of forces with the angles indicated, the side U V equals 86.6 pounds, and V T=50 pounds. The total weight balanced by the pull of 100 pounds equals 600+86.6=686.6 pounds. The side pull of 50 pounds deflects the weight, but does not force it in the direction of the fixed block.

Smart-Turner Centrifugal Pump

The accompanying half tone illustrates a double suction Centifuzal Pump, as built by the Smart-Turner Machine Co., Ham[illegible]. These people have been building both single and double suction pumps, for some [illegible]. This particular pump, however, is unique in the way the shell is connected to the pump frame, the bolts attaching them being placed in a cylindrical slot, so that by slacking off the nuts, the pump may be rotated on its axis so that the discharge may be taken off at any angle. Of course when doing this the suction is also carried round to a corresponding angle. While this is very advantageous it is even more so in the case of suction pumps, in which the suction [illegible] always come up vertically and [illegible] come off at any angle desired. [illegible] are well designed, and give excellent [illegible]



Double Suction Centrifugal Pump

. . . THE . . .

CANADIAN MANUFACTURER

and Industrial World

A Semi Monthly Newspaper devoted to the Manufacturing Interests of Canada—A Newspaper, Not an Organ.

Established in 1880. Published 1st and 3rd Fridays.

The Canadian Manufacturer Publishing Co., Limited

408 McKinnon Building, Toronto

President—J. J. CASSIDEY

Managing Director—D. O. McKINNON

Montreal Office—204 St. James Street,

Representative—ARTHUR B. FARMER

SUBSCRIPTIONS:

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

ADVERTISING RATES:

Made known on application to 408 McKinnon Bldg., Toronto

THE HYDRO-ELECTRIC POWER COMMISSION'S REPORT.

It is evident that the Hydro-Electric Power Commission are beginning to realize the magnitude of the task they have undertaken—to provide the cheapest possible power for the industries of Ontario.

On another page will be found the text of their latest report, which enjoys the following title: "Report on the Cost of Power Production through the Agency of Producer Gas Plants and other Prime Movers under the conditions obtaining in the Province of Ontario."

We have eliminated from the text of the report, which is given in full, all statistical tables, and individual reports by the Commission's experts on the various plants visited. These will be referred to in a later issue.

In this issue we have endeavored to follow the line of reasoning by the Commission, from the general survey of existing conditions to the deductions made. These deductions appear in the last column of the report as published.

This report will probably arouse controversy. Advocates of producer gas will vigorously dissent to the statement that "the average reliability of the producer gas plant at present is not sufficient to admit of any comparison with that of the steam engine or electric motor."

Steam engine builders have also room for objection. It is true that the report does give recognition to the statement that the cost of heating many factories during the winter months, when hydro-electric or producer gas power is used, is almost as great as the cost of fuel for both power and heating in an up-to-date steam plant. The report also draws attention to the fact, well known to engineers but sometimes lost sight of by buyers, that the steam engine will without danger to engine, take care of a heavy overload, whereas this is not possible with gas or gasoline engine. Yet advocates of steam power will find satisfaction with estimates or deductions based on the average cost of steam plants now operating throughout Ontario. They will insist that there have been such great improvements in steam engine design that a comparison of efficiency should be based, not on an average between a few up-to-date plants and several old ones but on what would be possible if a thoroughly up-to-date steam plant were installed instead of hydro-electro energy bought or a producer gas plant installed.

We invite the attention of all who are interested in the power problem to this report and further invite correspondence from any authority who may desire to emphasize or to take exception to any of the deductions made in this report.

NEW IMMIGRATION POLICY WANTED.

The time has come for a change in the immigration policy of the Dominion of Canada.

Credit must be given to the Laurier administration for the resourceful and vigorous manner in which it has advertised Canada in Europe and the Western States and as a result started such a tide of immigration to this country.

A few years ago Canada was in the position of a business man who to win attention for his wares, must strengthen his advertising by making an inducement to buyers. Now this country is like the merchant who finds such a demand for his wares that he can fix his own price for them.

Canada wants settlers for her millions of acres of idle wheat lands in the West—but not half as badly as the young men of the Western United States as well as of England, Scotland and Ireland want to get these acres.

The time for the inducement, the bonus to shipping agents has gone by. True, if the bonus is withdrawn there may be a slight falling off in the number of immigrants received from Europe. This is just what is desired. If a census of the thinking men of Montreal, Toronto, Hamilton and other cities were taken it is probable that 99% of them would agree that these cities, and the country at large, would be infinitely better off to-day, if the immigration from Europe during the last three years had been ten per cent. less than it has been.

The industrial depression of the past winter has probably accentuated the fact that the larger cities of Canada are being overrun by the scum of Europe, the ignorant, the shiftless and the criminal classes.

Why should we rejoice because Canada receives 200,000 or more immigrants in a year, when probably quarter of them are undesireable? We submit that our natural resources would be developed more quickly and without pollution of our national life, if we were to concentrate our energies on bringing into the country settlers of the best class.

We have won the interest and attention of young farmers throughout Great Britian and the United States and it will not be difficult to maintain a steady inflow of population from those countries. The Attorney-General of Alberta recently stated in Montreal that farmers from the North Western States "are crowding into Canada." These men are tried, experienced farmers and possess ample capital to start farming along the most approved lines in such a country as the Canadian West.

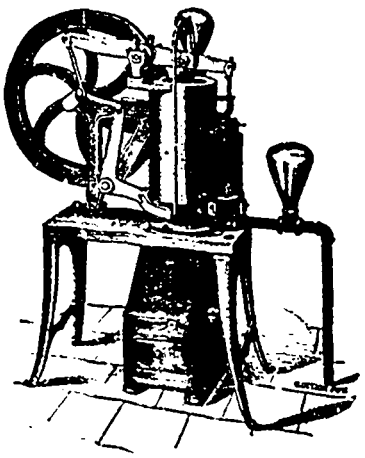
These men will build up Canada: immigrants who will not do this are not wanted.

The Canadian people look to Sir Wilfrid Laurier and his administration to keep Canada free from the criminal classes of Europe.

Hot Air Pumping Engines.

In many manufacturing concerns of all kinds, especially in those dependent upon their own water supply, there is a demand for a pumping engine which will combine simplicity of construction and operation with low cost for intermittent service. For such conditions the hot air pumping engines are unequalled.

The Rider and Ericsson hot air pumping



RIDER-ERICSSON ENGINE

engines were invented about thirty years ago, and are built by the Rider-Ericsson Engine Co., New York.

The operation of the engine is extremely simple. A small fire of coal, wood, gas, kerosene, or anything else that will produce a good heat, is all that is required. In ten or fifteen minutes a turn of the fly wheel will set the engine in motion. There is no boiler to explode, no steam gauge, no valves, practically no possibility of accident. The worst result of neglect is probably that the engine will stop for want of fuel.

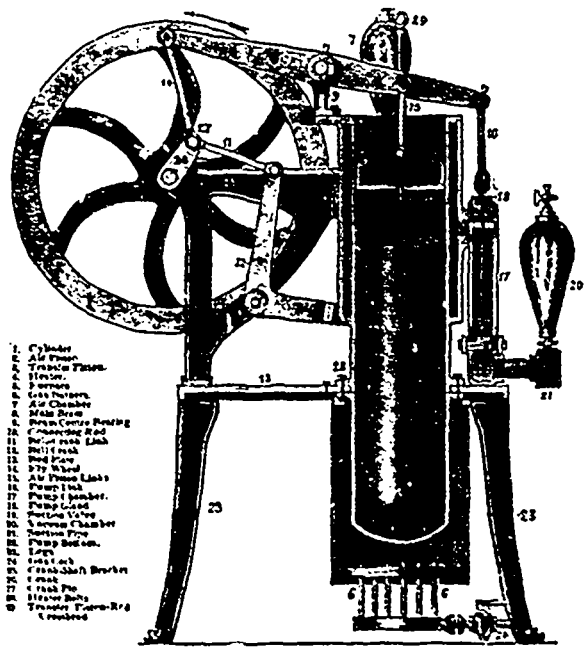
The construction of the Ericsson engine is shown in the accompanying cuts. At the lower end of the cylinder (1) is the furnace (5), adaptable for coal, wood, or any other fuel. This furnace heats the lower end of the cylinder to a high temperature. In the cylinder are two pistons, the air piston, (2), and the transfer piston (3). The transfer piston serves to transfer the air in the cylinder from the lower space, to the space between it and the air piston.

The action is as follows: The two pistons are so arranged that the transfer piston follows about a half a stroke behind the air piston. When the air piston commences its down stroke, the transfer piston is completing its up stroke. The air in the cylinder is mainly in the space between the two cylinders, which part is water-jacketed, and is consequently cool. The down stroke of the air piston, with the rest of the up stroke of the transfer piston forces the air into the lower end of the cylinder, where it is quickly heated, and expands, giving a powerful thrust to the up-stroke of the air piston. As the air piston rises, the transfer piston completes the down stroke, forcing the air into the upper chamber when it is again cooled preparatory to the next down stroke of the air piston.

This direct application of the heat to the cylinder effects great economy where occasional service is required, as the engine will run all day on the amount of fuel necessary to get up steam in a steam pump.

Special designs of pumps are made for different purposes, as for deep wells, for high pressure, or where a large quantity of water is to be pumped to a limited height as is often the case in turpentine distilleries, quarries, and brickyards.

Messrs. R. H. Buchanan & Co., Montreal, Canadian agents, are showing one of those engines in operation in their window, 234 Craig Street West, Montreal.



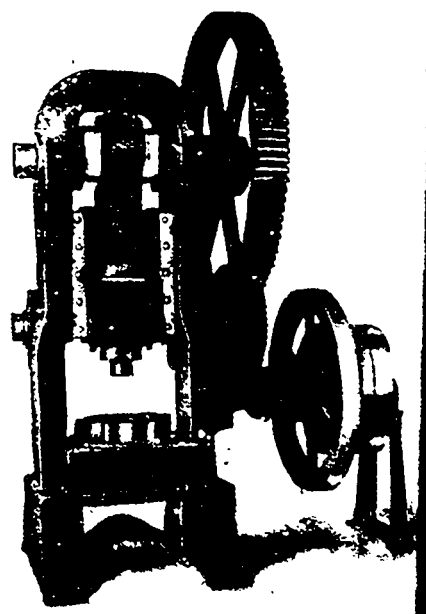
SECTIONAL VIEW OF RIDER-ERICSSON ENGINE

The Dodge Manufacturing Company, are removing their Montreal branch to the corner of St. Paul and Duke Streets. The new premises will enable them to carry a much more complete stock in Montreal than heretofore.

Heavy Press for Stamping Cones.

Illustrated herewith is a cut of a heavy press recently installed in the works of the Chapman Double Ball Bearing Co., Limited, by the London Machine Tool Co., Limited of Hamilton, Canada.

This press, the heaviest of its kind in Canada, is designed for the pressing out of cones and cups for ball bearings for use on shafts up 6 inches diameter. The frame of



press is a steel casting, weighing about 6 tons, and made by the Montreal Steel Works, Limited. The bearing throughout is of steel cut from the solid. The shaft is of hammered steel working in bronze bushes. The shaft is 8 inches diameter in the frame and 8 inches in the crank. The plunger is of very heavy construction and has a long bearing on the bed. Adjustable gibs are provided for taking up the wear. The adjustment of plunger for setting dies is made by heavy right and left-hand screw having saw tooth threading, the screw being 6½ inches diameter. The screw is graduated to adjust within 100th of an inch: finer divisions can be made if desirable.

A novel feature in the clamping of the screw is that ¼ of the nut is cut away in pintle and that a hardened steel threaded block is inserted in this cut-out. Adjustable set screws on the outside of pintle force this nut into the screw jamming it tight, and preventing any movement.

The machine is double back geared in a ratio of 24 to 1.

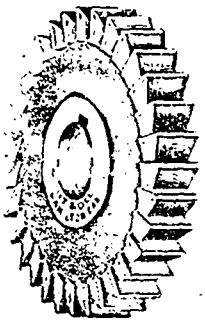
It is started and stopped by means of friction clutch of multiple disc type and friction break; these devices making the machine under absolute control.

An interesting feature is that the loose pulley and fly wheel are bushed with Chapman ball bearings making the machine almost frictionless when not in use.

The machine is capable of exerting a pressure of 600 tons. Weight complete about 26,000 lbs.

NEW CATALOGUE OF MACHINE SHOP SUPPLIES.

The Hamilton Tool Co., Limited, Hamilton, Canada, have emphasized the extension of their concern and of the number of lines carried by issuing a catalogue of their lines. This is a booklet of 36 pages, giving list of sizes and numbers, with full particulars as to dimension and capacity of face and side milling cutters, end mills, standard T slot cutters, metal slitting saws, formed saws for



Side Milling Cutter Made by the Hamilton Tool Company.

slitting copper, angular cutters, cutters for spiral mills, cutters for grooving taps and reamers, reamers of all kinds, counter boxes, also of "Beaver" drill chucks and collets and of sensitive drills made by the concern.

As this firm is the only one in Canada making this complete line of tools their catalogue should be in the hands of every manufacturer who has a machine shop A copy will be gladly sent to any concern mentioning this reference to it.

THE CANADIAN BUILDERS' SHOW.

A Concrete House, Built in 24 Hours, to be a Feature.

Manufacturers and others who have taken an interest in the housing of employees, were rather skeptical when Edison announced that he would build concrete houses in 24 hours. It is now announced that such a house will be seen at the forthcoming show in connection with the Canadian Builders' Association, to be held during Easter week, at the Coliseum, Guy and Dorchester Streets, Montreal. Such an exhibit is bound to be of great interest to manufacturers, as well as contractors, builders, and the man in the street.

The above is but one of many novel displays that will comprise one of the most attractive trade exhibitions ever held in the Canadian metropolis. Many of the booth holders are already making their preparations for the event and many novelties and utilities for the building trades are already promised, and are bound to have considerable drawing power with the multitude.

The Master Painters' Association and Master Plumbers' Association have each secured a number of booths, and are at work getting together exhibits of the various sections of trade belonging to their departments. Spaces have also been allotted to the Provincial Government, and other public bodies will in all probability be represented. American as well as Canadian concerns are sending samples of their manufactures, and the spacious area of the Coliseum will for that week be the hub of the builders' universe.

Efforts are being made to effect a uniform decorative scheme so as to add to the attractiveness of the whole. Special value will be attached to the show as a commercial enterprise by reason of the congress of the National Builders' Association, besides other conventions held in Montreal during that week. It is, therefore, easy to understand why so many firms nearly connected with the building, contracting, and allied trades are desirous of displaying their wares.

Among other features to attract the general public will be a popularity competition, in which the boy or girl for whom the largest number of votes is cast, will receive a lot of land on the Prefontaine estate, valued at $500. It is stated that all possibility of gambling has been eliminated, and besides encouragement of thrift, there will be other advantages attached to the contest.

Visitors and friends will be cordially welcomed at the booth of The Canadian Manufacturer, which will be in charge of our Montreal representative, Mr. A. B. Farmer.

OFFICERS OF THE CANADIAN CROCKER-WHEELER CO. LIMITED

The officers of the Canadian Crocker-Wheeler Co., Limited, are well known to the electrical and manufacturing trade in Canada.

Mr. F. E. Lovell, President of the new company, is a member of the old established firm of H. Lovell & Sons, of Coaticooke, P.Q., who have extensive interests in mills and timber limits throughout the Province of Quebec.

Messrs. Russell A. Stinson and F. Jno. Bell, Vice President and Secretary-Treasurer respectively, have been identified with the manufacturing, construction, and sales ends of the electrical trade in Canada for the past fifteen years, and are particularly well known in Montreal where they are welcoming their many old friends at the head office of the Company which has recently been opened in the Street Railway Chambers, Place d'Armes Hill.

ORDERS FOR CANADIAN MADE TURRET LATHES.

Since the Stevens Co., of Galt, Limited, started to manufacture the Jones & Lamson type of turret lathe in Canada they have met with gratifying success in introducing them to Canadian users. Among the firms to whom they have made sales of this machine tool are the Canadian Gas Power & Launches Co., Toronto; the Canadian Northern Railway Co., Winnipeg; Cowan & Co., Galt; the Canadian Machine Telephone Co., Toronto; the R. McDougall Co., Galt and the McLaughlin Carriage Co., of Oshawa.

A NON-FREEZING HYDRANT.

Tests of a street hydrant of new design have been made recently by the Montreal water works.

The new hydrant is fitted with a valve, which automatically empties the hydrant as soon as the water is shut off.

Another feature of the new design is that one, two, three, or four reels may be connected without stopping the flow of water.

This hydrant is the invention of Mr. Isaac Laurin, of the Marvel Street Hydrant & Novelty Co., Lindsay, Building, Montreal.

THANKS TO TECHNICAL EDUCATION.

There are 31 aniline color works in Germany, but the bulk of the trade is in the hands of five firms, forming two large combinations. The combined nominal capital of these five firms is nearly £5,000,000 and the net annual profits £2,000,000, 10 per cent. of which is paid in dividends, the remainder going to depreciation and reserve. The average dividend of the aniline dye works has exceeded 20 per cent. for years past, and the dividend paid by individual firms has in some cases exceeded 30 per cent. The firm of Bayer alone employs 5,200 work people, whilst the Badische Aniln and Soda Fabrik employs 7,251. The average working day is nine hours in the case of the first-mentioned firm, and ten hours in that of the second, which latter, in 1905, paid an average wage of 4.01 marks per day as against 3.38 marks in 1895. The Badische firm began business in 1865, and started with only 40 men.—Keehlow's German Trade Review.

Publications Worth Reading.

Any Manufacturer or Dealer in Supplies for this Column is invited to send Books on Business Topics for Review or Booklets, Pamphlets, etc., for Reference.

Jeffrey Mine Equipment.—An 8-page booklet illustrating 14 Jeffrey specialities of interest to mining engineers. The Jeffrey Mfg. Co., Columbus, O.

Color Chart.—Devoted to "One-Bath Dyeings Fast to Milling Produced with Anthracite Cromate Colors." The Cassella Color Co., New York and Montreal

Campbell Gas Engines.—A 24-page catalogue giving detailed information with illustrations of the "Campbell" gas engines and suction gas plants. Jones & Glassco, Sovereign Bank Bldg., Montreal.

Bulletin No. 98—The Crocker-Wheeler Company, February, 1908, (superseding Bulletin No. 78), devoted to form L Machine Belt Type Direct Current Motors of 1 to 5 H.P. Generators. 16 to 2.5 K.W., and their applications.

Bulletin No. 99.—The Crocker Wheeler Company, February, 1908. This contains an article on Crocker-Wheeler Motors in the Bethlehem Rail and Structural Mills reprinted from The Iron Age of January 23, 1908.

REVIEW OF PUBLICATIONS.

R. H. Buchanan & Co., Montreal, have just issued their new catalogue for 1908. Their specialty is pumps and pumping machinery of any capacity for every purpose.

Centrifugal and turbine pumps, which only a few years ago had reached their limit at an elevation of about 100 feet are now successfully built for any elevation up to 2,000 feet. They are becoming a rival to reciprocating pumps, and in many cases the efficiency is much higher, and the centrifugal pump takes less space than a reciprocating pump. They are used for general water supply, boiler feed, and fire service, or any other purpose for which reciprocating pumps are used.

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.

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

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.

RUBBER STAMPS

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

BOILERS AND ENGINES

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

SALESMAN WANTED

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

ARTICLES WANTED.

SECOND HAND SAFE WANTED—IN good condition. J. B. Huether, Walkerton.

WANTED - SECOND-HAND HAND PUMP fire engine, if not in good order and quality need not offer. Write John A. McDonald, Town Clerk, Kearney.

WANTED TO BUY - A SMALL STEAM BOAT second hand, also half dozen row boats, state price wanted. Address Geo. Woolway, Lakeside, Ont.

2 WATERWHEEL GOVERNOR — 2 150-light D.C. generator Box 297 St. Catharines, Ont.

SCRAP METALS, PAPER, ETC.

E. PULLAN, TORONTO, positively the largest dealer in paper stock in the Dominion. Also rags, iron, metals, etc. Corner Adelaide and Maud Phone Main 4633, Toronto.

F. W. HORE & SON, Limited, HAMILTON ONTARIO.
Manufacturers of **Shafts, Poles, Rims, Hubs, Spokes, Sleigh Runners, Etc.**

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.

MACHINERY FOR SALE.

Brown Engine, 75 h.p., good condition; Large Gap Bertram Lathe; Drill, 21" centre, Pollock & MacNab, Manchester; Milling Machine; Slotting Machine; Surface Wood Planer; Post Drill; also a lot of Pulleys and Belting - JEFFREY BROS., Petite Cote, Montreal.

MANUFACTURING RIGHTS FOR SALE.

SHOP LICENSES to manufacture W. J. Mackay Patent Feather Edge Sectional Steam and Hot Water Boilers under Canadian Patent No. 97,582 This is a positive preventative against breakage from rust, is the latest improvement in boiler construction, and is more largely used in the United States than any other construction. For licenses or outright sale at reasonable figures, address, Alexander Mackay, 70 Victoria Square, Montreal, Canada.

SHOP LICENSES to manufacture a new style of Files that can be easily sharpened when dulled. Canadian Patent No. 99315 Address, Henry Gelaz, P.O. Box 292, Schenectady, N.Y., U.S.A.

Rock, Ore, Cement, Clinker, Coal,
Crushers and Pulverizers
The Senator Mill Manufacturing Co., Limited
Galt, Ont.

We have Pulverizing Mills in eight Portland Cement factories in Ontario and are building 20 Griffin mills for the Belleville plant of the Lehigh Portland Cement Co.

FOR SALE
WIRE STRAIGHTENING MACHINES

automatically straighten and cut off accurately any lengths up to 6 feet, sizes of wire No. 14 to 7 gauge

These machines are in good order and do perfect work. We have three to spare and will sell one or more as desired. Price, complete with counter shaft, $75 each.

Also, have some good nail machines which we will tell you about if interested.

THE PAGE WIRE FENCE CO., LIMITED
WALKERVILLE, ONT.

The DOMINION OIL CLOTH CO.
LIMITED
Manufacturers of....
LINOLEUMS
FLOOR OIL CLOTHS
TABLE OIL CLOTHS
Also Carriage, Stair and Enamelled Oil Cloths, Decorative Burlaps.
Office and Works - MONTREAL

BOILERS, ENGINES, PUMPS, WOOD AND IRON WORKING MACHINERY

Largest stock in Montreal.
Terms and Prices always right.

W. L. Miller & Co.
32-44 St. George Street, MONTREAL

MAPLE LEAF
STITCHED COTTON DUCK
BELTING
DOMINION BELTING CO. LTD.
HAMILTON CANADA

TO MANUFACTURERS

THE WINNIPEG ELECTRIC RAILWAY CO. has for sale

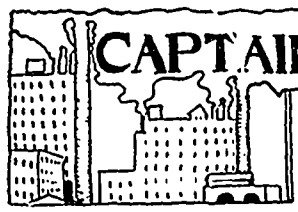
A Large Surplus of Hydraulic Electric Power Ready for Use by Manufacturers.

And would be willing to supply power in any quantity to manufacturers who may decide to locate at Winnipeg or St. Boniface.

Prices and terms on application, stating nature of proposed manufactory and quantity of power required, to

WILFORD PHILLIPS, Manager

WINNIPEG ELECTRIC RAILWAY CO., WINNIPEG



CAPTAINS OF INDUSTRY

The following items of information, which are classified under the title "Captains of Industry," relate to matters that are of special interest to every concern in Canada interested in any manufacturing industry whatever, this interest extending to supply houses also.

The Ballantyne Lumber Co., Toronto, have been incorporated with a capital of $40,000, to manufacture lumber, timber, etc. The provisional directors include W. J. Foster, Hawkestone, Ont.; E. Clark and A. E. Clark, Toronto.

Port Arthur, Ont., has received assurances from the Ontario government that the lease of Dog Lake power will be granted as soon as the details can be arranged. The government will build a regulating dam at the outlet of the lake at a cost of $20,000.

The Guest Bridge over the Thames River London, Ont., which was destroyed a short time ago, will be rebuilt at once.

Messrs. G. A. Stimson & Co., Toronto, have purchased $4,520 bonds of the town of Walkerton, Ont., bearing four and five per cent. interest, and maturing part at the end of twenty years and part in ten instalments.

The Aureole Mining Co., Ottawa, have been incorporated with a capital of $40,000, to carry on a mining, milling and reduction business. The provisional directors include J. B. Lewis, V. V. Rogers, Ottawa, and P. B. Winning, Plantagenet, Ont

The large dry goods block of T. E. Vanstone, Owen Sound, Ont., was destroyed by fire, March 18. Loss about $45,000.

A new bridge will be built at Poplar Hill, Middlesex county, Ont. The bridge will be built of steel and concrete, 60 feet long, and will cost about $2,000.

The Norfolk Gas Co., Port Dover, Ont., have been incorporated with a capital of $60,000, to manufacture gas, oil, minerals etc. The provisional directors include H. W. Ansley, F. W. Denton and J. Law, Port Dover, Ont.

The Relindo Shoe Co., Toronto, have been incorporated with a capital of $100,000, to manufacture boots, shoes, etc. The provisional directors include I. W. Johnston, C. Fogelberg and R. Hargraves, Toronto.

The Ontario Power Commission have received application from the city of Toronto for 10,000 h.p. This with the other applications on hand totals some 27,000 odd h.p., the Commission have been requested to furnish.

Hogan & Co., who have the contract for the building of the addition to the breakwater at Port Arthur, Ont., state that work will commence about the latter part of April. 5,000,000 feet of timber will be used in the cribs.

The Ontario Development Co., Toronto, have been incorporated with a capital of $25,000, to carry on a mining, milling and reduction business. The provisional directors include J. M. Ewing, A. G. Ross and F. H. McCarthy, Toronto.

Monteith-Nixon, Limited, manufacturers trucks, etc., Toronto, are to be wound up.

The Consolidated Gold & Silver Mines, of Elk and Larder Lake, Toronto, have been incorporated with a capital of $3,000,000, to carry on a mining, milling, and reduction business. The provisional directors include F. Watts, C. Scott and J. L. Galloway, Toronto.

An electric line is being considered in Ottawa, taking in Prescott, Brockville, Lyn, Athens, Perth, Lanark, and other places, making a belt line of about 200 miles in length.

A branch line of the Canadian Northern Railway will be built from Udney to Orillia, Ont., this season.

The Canada Flakes Co., Peterboro, Ont., have been incorporated with a capital of $40,000, to carry on a general milling business. The provisional directors include A. B. Cunningham, J. Wiskin, and A. E. Micks, Peterboro, Ont.

A deputation of thirty men from Haileybury, Ont., visited Toronto, recently, and called upon the Temiskaming & Northern Ontario Railway Commission. They asked that a spur line be run from a point on the Temiskaming & Northern Ontario line half a mile south of the town, down to Haileybury wharf, so as to complete freight connection via the navigation companies with the Canadian Pacific Railway, at Temiskaming 65 miles south, on Lake Temiskaming. The proposed line will be of service chiefly to the lumbering and brickmaking concerns along the lake shore. The spur would be about one and a half miles long, and would cost $27,000.

Northern Discovery Co., Bracebridge, Ont., have been incorporated with a capital of $40,00, to carry on a mining, milling and reduction business. The provisional directors include G. Mahaffy, A. C. Salmon and E. Archer, Bracebridge, Ont.

Palmerston, Ont., will receive tenders until April 14, 1908, for the following contracts: Contract A, sub-division (1), labor, etc., for constructing waterworks system; subdivision (2), cast-iron water-pipe, valves and hydrants. Contract B, the supply and erection of a steel stand pipe.

J. G. Sing, engineer, Toronto, will receive tenders up to April 24 for Toronto Island breakwater extension.

The Grant Contracting Co., Toronto, have been incorporated with a capital of $25,000, to carry on a general contracting and constructing business. The provisional directors include A. C. Grant, R. B. Coulson and A. B. Barker, Toronto.

The C.M.B. Association, Chatham, Ont., will erect a new three story block.

The Ontario Lantern & Lamp Co., Hamilton, Ont., have taken out a permit for an addition to their plant to cost about $4000. The extension will be made to the incandescent lamp department, which is at present too small to accommodate the increasing business of the firm. About 6,000 square feet will be added and a lot of new machinery installed.

The Berlin Lion Brewery, Limited, Berlin, Ont., have been incorporated with a capital of $250,000, to manufacture beer, malt, etc. The provisional directors include C. N. Huether, J. Walters and H. J. Sims, Berlin, Ont.

The Brant Portland Cement Co., Brantford, Ont., have been incorporated with a capital of $500,000, to manufacture cement lime, plaster, stone, etc. The provisional directors include T. Elliott, W. C. Goldy Brantford, Ont., and J. H. Fisher, Paris.

Ulrica Mining Co., Toronto, have been incorporated with a capital of $1,000,000, to carry on a mining, milling and reduction business. The provisional directors include J. F. Boland, F. Watts and E. W. Nelles, Toronto.

The McCleery Basket Co., of Canada, Toronto, have been incorporated with a capital of $100,000, to manufacture paper baskets, etc. The provisional directors include E. B. Ryckman, C. W. Kerr and C. S. McInnis, Toronto.

A new library will be erected in connection with Victoria University, Toronto, at a cost of about $83,000.

The Lion Chemical Co., Toronto, have been incorporated with a capital of $40,000, to manufacture chemicals, etc. The provisional directors include O. Flett, E. A. G. Heal, and D. McKichan, Toronto.

A new bridge will be erected over Deer Bay Creek, near Peterboro, Ont., this spring.

It is expected that the Atikokan Iron Co., Port Arthur, will re-open their plant in the very near future. Several improvements will be made to the premises.

Hamilton Builders' Supply Co., Hamilton, have been incorporated with a capital of $40,000, to manufacture builders' supplies, etc. The provisional directors include J. W. Nesbitt, J. G. Gauld, and N. Slater Hamilton, Ont.

The Roman Catholics of Riverdale, Toronto, will erect a new church this season at a cost of about $30,000.

Stewart & Witton, architects, Hamilton, Ont., are receiving tenders for equipping all of the city schools with fire escapes

The theatre of the Summer Stock Co., Hamilton, Ont., will be considerably altered and improved.

The Fischer Lumber Co., Dryden, Ont., have been incorporated with a capital of $100,000, to manufacture lumber, timber, etc. The provisional directors include L. G. Fischer, Buffalo, N.Y., M. A. Sanders and R. V. Le Sueur, Sarnia, Ont.

The ratepayers of Kenora, Ont., voted favorably on the by-law for the exemption of the Maple Leaf Milling Co., from paying any municipal taxation.

R. Parker & Co., Toronto, will build a three story addition to their factory at a cost of about $12,000.

West Coleman Silver Mines, Haileybury, Ont., have been incorporated with a capital of $750,000, to carry on a mining milling and reduction business. The provisional directors include T. H. Jessop, N. E. Strong and J. H. Hurlburt, Haileybury, Ont

The Missouri Pearl Button Co., Burlington, Iowa, have secured a lease on premises in Windsor, Ont., for a branch factory.

The Pittsburg Plate Glass Co., Pittsburg, Pa., are considering the establishment of a branch at Windsor, Ont.

The Canadian Northern Railway Co. will relay their line between Winnipeg, Man., and Port Arthur, Ont., with 80 pound rails this season.

Sharpe Lake Mines, Haileybury, Ont., have been incorporated with a capital of $120,000, to carry on a mining, milling and reduction business. The provisional directors include E. A. Wright, H. D. Graham and N. B. Strong, Haileybury, Ont.

Greer Bros., Port Arthur, Ont., have taken out 1,500,000 logs and ties this season. Of these 600,000 are on the Grand Trunk Pacific grade. The firm are erecting a saw mill near Port Arthur, Ont.

The Trenton Cooperage Mills are being organized in Trenton, Ont.

The St. Catharines Brick & Tile Co., St. Catharines, Ont., have been incorporated with a capital of $60,000, to manufacture brick, terra cotta, tiles, sewer pipe, etc The provisional directors include J. M. Carter, H. A. Cozzens, and W. Lowe, St. Catharines, Ont.

The Russell Lighting & Mfg. Co., Russell, Ont., have been incorporated with a capital of $50,000, to manufacture woollen, cotton, etc., and to generate electric power. The provisional directors include T. A. Carscadden, W. F. Kenney and J. D. McPhail, Russell, Ont.

Jas. A. Cline, Limited, Stratford, Ont., have been incorporated with a capital of $100,000, to manufacture furniture, interior fittings, etc. The provisional directors include J. A. Cline, W. H. Dunbar, and R. T. Orr, Stratford.

The Lake Shore Wood Co., Toronto, have been incorporated with a capital of $100,000, to manufacture lumber, timber, etc. The provisional directors include H. M. Ledman, M. C. McCannel, and H. A. Munro, Toronto.

The Wilmerhill Mfg. Co., Toronto, have been incorporated with a capital of $40,000, to manufacture goods, wares and merchandise. The provisional directors include F. W. Merrill, E. C. Hill and A. M. Manson, Toronto.

The Vending Cabinet Co., Toronto, have been incorporated with a capital of $200,000, to manufacture spices, powders, etc. The provisional directors include S. Snyder, W. G. K. Scott and R. Whyte, Toronto.

R. Robertson & Sons, Toronto, have been incorporated with a capital of $30,000, to carry on a general contracting and constructing business. The provisional directors include R. Robertson, J Robertson and W. E. Robertson, Toronto.

The premises of St. Joseph's Roman Catholic church, Toronto, were destroyed by fire, March 30. Loss about $40,000.

The Acdus Mineral Co., Ottawa, have been incorporated with a capital of $500,000, to carry on a mining, milling and reduction business. The provisional directors include E. E. La Beree, Ottawa; A. E. Downing, Chicago, Ill., and N. A. Harpin, New York.

Black Donald Graphite Co., Calabogie, Ont., have been incorporated with a capital of $40,000, to carry on a mining, milling and reduction business. The provisional directors include H. H. Williams, J. G. Gibson, and W. C. Perkins, Ottawa.

Dupuis Freres, Montreal, have been incorporated with a capital of $500,000, to manufacture dry goods, clothing, etc. The provisional directors include J. N. Dupuis, S. Beaudin and L. Guerin, Montreal.

An electric lighting plant will be installed in Sutton, Que.

Quebec, Que., will receive tenders up to April 25 for the construction of a landing pier at St. Pierre Les Becquets, county of Nicolet, Que.

The capital stock of the Nichols Chemical Co., Montreal, has been increased from $25,000 to $225,000.

Dominion Amusement Park, Montreal, which was destroyed by fire sometime ago, will be rebuilt at a cost of about $150,000.

The Imperial Locomotive Works, Limited, which British capitalists are to establish at Lachine, Que., will begin the construction of buildings in the early spring and the installation of the plant will be pushed forward as rapidly as possible. A site of a hundred acres has been secured opposite Lachine station. The cost of the plant will be about $2,250,000.

The Canada Bag Co., Montreal, have closed down one of their factories for some time.

The Willis Piano Co., of Ste. Therese, Que., have been incorporated with a capital of $100,000, to manufacture pianos, organs, gramophones, furniture, sewing machines, motors, etc. The charter members include A. P. Willis, R. A. Willis and C. D. Patterson, Westmount, Que.

The Clark Automatic Nut-lock Co., Limited, 12 St. Peter Street, Montreal, have resumed production after having suspended since September. Messrs. Dinning & Eckenstein, Merchants Bank Building, are sales agents.

The town council of Verdun, Quebec, will erect a city hall at a cost of about $30,000.

A new Protestant school will be erected this year at Cote St Paul, Montreal. Jas. E. Adamson, Coristine Building, Montreal, is the architect.

The Marvel Street Hydrant & Novelty Co., Lindsay Building, Montreal, will build a machine shop and foundry for the manufacture of their non-freezing hydrant and other patents next summer.

The Dunlop Tire & Rubber Co., St. John, N.B., have moved into their commodious new premises on Canterbury Street.

The St. Lawrence Lumber Co., Three Rivers, Que., will erect a new mill at Dalhousie, N.B., at a cost of about $150,000.

C. E. W. Dodwell, Halifax, N.S., invites tenders up to April 21 for the construction of three ice piers in the Annapolis River at Annapolis Royal, N.S.

The Standard Car Co., Durham, Pa., are considering the establishment of a plant in Sydney, N.S., to manufacture locomotive car wheels under a special process. The capital of the company is to be in the vicinity of $1,500,000. They ask for free site, water and normal taxation.

The Westinghouse Electric & Mfg. Co., through its export department, has received a contract from the Dominion Iron & Steel Co., of Halifax, N.S., for a 500 h.p. electric generator, which will be used in the operation of one of the company's iron mines on Belle Island, Nfld.

Harpell-Stokes, Limited, Winnipeg, Man., have been incorporated with a capital of $50,000, to manufacture electrical apparatus, machinery, etc. The provisional directors include B. J. Harpell, C. W. Stokes and P. V. Wright, Winnipeg, Man.

The Winnipeg Electric Railway Co. Winnipeg, Man., will shortly be given one year's notice to place all their wires in the central portion of the city underground.

The city of Winnipeg, Man., will spend about $1,130,000 on local improvements this year. About $600,000 will be spent in asphalt improvements; $32,000 on block pavements, and $500,000 on plank and granolithic walks, sewers, grading and water mains.

The premises of Taylor's grist mill, Carman, Man., were damaged by fire, March 16.

Tenders will shortly be called for the construction of the new union station at Winnipeg, Man., for the Grand Trunk Pacific and Canadian Northern Railways. The building will be four stories high, 358x140 feet. The work in connection with the station and terminals will cost about $2,000,000.

Fire in the business section of Deloraine, Man., caused damage to the extent of $20,000, March 20.

L. L. Head & Son have started a lumber business at Rivers, Man.

The Winnipeg Navigation Co., Winnipeg, Man., have been incorporated with a capital of $50,000, to manufacture ships, vessels, etc., and to carry on a general navigation business. The provisional directors include W. Cowan, Prince Albert, Sask., A. McKenzie and H. A. Robson, Winnipeg, Man.

The B. Shragge Iron & Metal Co. Winnipeg, Man., have been incorporated with a capital of $50,000, to manufacture iron, metal, etc. The provisional directors include B. Shragge, L. Berger and T. J. Powell, Winnipeg, Man.

The Hart-Parr Engine Co., of Charles City, Iowa, manufacturers of gasoline engines, have announced their intention of opening up a branch of the concern at Portage la Prairie, Man. I. P. Porter has been appointed manager and premises will be secured at once and a full line of stock installed.

The Manitoba Linseed Oil Mills, Winnipeg, Man., will erect a large building at St. Boniface, Man., at a cost of about $75,000.

The premises of the Imperial Elevator Co., Rosenfeld, Man., were destroyed by fire, March 19.

Edmonton, Alta., invite tenders up to April 10 for the construction of 70 miles wire fence around Buffalo Park, in the Province of Alberta.

The new line of the Canadian Pacific Railway between Lethbridge and Macleod, Alta., on the Crow's Nest branch, will be built this year.

The ratepayers of Medicine Hat, Alta., voted favorably upon three by-laws authorizing the issue of debentures, which aggregate $75,000. The money will be expended as follows: $40,000 for extension of waterworks mains; $25,000 for extension of gas system and $10,000 for the erection of a market building.

The new electric light plant being erected in Battleford, Sask., has been completed.

A court house building is being considered for Moose Jaw, Sask.

A Collegiate Institute will be erected at Moose Jaw, Sask., at a cost of about $100,000.

Coattman & Cloakley, Regina, Sask., are preparing plans for a large apartment building to be erected at Moose Jaw, Sask., this coming season at a cost of about $120,000.

Fire station No. 2 will be erected this summer north of the Canadian Pacific Railway tracks in Regina, Sask. The cost will be about $10,000.

At a recent meeting of the Calgary Natural Gas Co., Calgary, Alta., the following gentlemen were elected officers for this year: President, J. K. Kerr; vice-president, A. E. Cross; secretary-treasurer, Fred. Higgs; managing director, F. F. Higgs.

The new depot and freight sheds which are being constructed by the Canadian Pacific Railway at Saskatoon, Sask., are now rapidly approaching completion and will soon be opened for business. The total cost of the station will be about $35,000 and of the freight sheds, $14,000.

The roundhouse being erected by the Canadian Pacific Railway at Sutherland, Sask., is nearing completion. The cost of the engine house is estimated at $45,000

The Western Fireclay Products, Limited, a company capitalized at $600,000, have decided to locate at Weyburn, Sask., and will manufacture fireclay, tile, sewer pipe, etc. The clay deposits are situated a few miles west of the town and will be brought there for manufacture.

The Saskatchewan Elevator Co. are erecting large coal sheds at Buchanan, Sask.

The International Lumber & Development Co. have opened a branch lumber yard at Webb, Sask.

G. C. Emerson, Saskatoon, Sask., is erecting a factory 50x24 feet for the manufacture of tents and carpets.

A new school building will be erected at Craik, Sask., at a cost of about $12,000.

A large theatre will be erected shortly in Calgary, Alta.

The Carter-Hull-Aldringer Co., Winnipeg, Man., have been awarded the contract for the erection of the new jail at Moosomin, Sask. When completed the jail will cost about $60,000.

A new public school will be erected in Edmonton, Alta., at a cost of about $60,000.

The Western Plumbing & Heating Co., Saskatoon, Sask., have secured a site and will erect a new building.

The Inland Cigar Mfg. Co., Kamloops, B.C., are considering the removal of their plant to the coast.

Ladysmith, B.C., are considering the installation of an electric lighting plant.

The Sunset Power Co., New Westminster, B.C., have made application for water to be taken from the Quanli River and to be returned at or near the mouth.

Foley Bros. & Larsen, Winnipeg, Man., have been awarded the contract by the Grand Trunk Pacific for the construction of 10 miles of railway from Prince Rupert, B.C., eastward.

The Dominion Government are arranging to establish a wireless or cable telegraph service between Prince Rupert, B.C., and Queen Charlotte Island, and between various other larger islands.

On March 9 the largest shipment of silver ever made in Canada is said to have left the Consolidated Mining & Smelter Co.'s plant at Trail, B.C., en route to the chartered Bank of India, Australia and China at Hong Kong. The shipment weighed nearly five tons and was valued at $80,000.

Smith Curtis and W. H. Fowler have discovered a 7-foot seam of bituminous coal at Biche Creek, near Kamloops, B.C.

A new court house will be erected at Kamloops, B.C., this year, at a cost of about $56,000.

The new office building being erected for the Imperial Shingle Co., Vancouver, B.C., has been completed.

A. Urquhart, Comox, B.C., is installing a 60 inch by 16 foot Goldie-McCulloch boiler in his mill at Cumberland, Vancover Island.

The Alberta Lumber Co., Vancouver, B.C., have installed considerable new machinery in their plant.

The False Creek Lumber Co., Vancouver, B.C., purpose extending their mill in the near future.

W. P. Fowle, late manager of the Fraser River sawmills, New Westminster, B.C., now in partnership with R. E. Nevins, will shortly commence building a large saw mill almost directly opposite the Fraser River mills at Bon Accord, B.C.

For the second time this year the monthly returns of the building department at Vancouver, B.C., show an excess over the corresponding months of last year. The February total amounts to $368,225, as against $319,220 for last February, an advance of $49,005. The advance over the 1907 record for the months of the year now stands at $217,425.

Chas. Warwick is erecting a shingle mill in South Vancouver, B.C.

The large mills being erected on Lulu Island by McDonald-Barnet Co., are being rushed to completion and it is expected both the shingle and lumber mills will be in operation during the coming summer. The shingle mill will contain six machines and will have a capacity of 200,000 shingles a day. The foundations for the lumber mill have been built and the mill itself will be put up right away. Two large dry kilns are being put up in connection with the mills and it is expected that the shingle mill will be in operation early this month.

STEEL MILLS FOR CAMPBELLFORD.

The municipality of Campbellford, Ont., has passed a by-law granting a five acre site, exemption from taxation and electrical power at $10 per h.p. to the Canadian Steel Rolling Mills Co., Limited, who in return promise to erect a steel rolling mills building of brick, stone, cement or steel or other suitable material or partly of one and partly of another of the said materials, equipped with all modern machinery and plant for the working thereof as a going concern at a cost of not less than $60,000, exclusive of land; to start the erection of this plant at once and to be in position to manufacture sheet or bar iron on or before January, 1, 1909, to employ eleven months in the year at least 100 hands for at least ten years.

The Canadian Steel Rolling Mills Co. is composed of Messrs. Henry L. Balcom, of Buffalo; David B. Marwick, of Akron, Ohio; Simon Ludley, of New Britain, Conn.; James Davidson and William Rutherford, of Peterborough, Ont.

This is the third industrial by-law passed by Campbellford within a year. The first was to give a bonus to the Dickson Bridge Co., whose product is already on the market.

The other by-law was to develop electrical power for municipal purposes.

"When completed," writes Mayor W. J. Doxsee, a progressive manufacturer in that town, "the town will own one of the best power plants in the province, being 5,000 h.p."

"The contract has been let for the section of Trent canal," adds Mayor Doxsee. "When completed this will pass right through the town, following the course of the river.

"Several hundred thousand dollars will be paid out in wages here this summer. Already a great rush is on in building, as not a vacant house can be got in town."

THERE MAY BE OTHERS.

It seems to be a fact that many business men do not pay as much attention to the buying of their business as they should. It is necessary that a manufacturer give his best judgment and his utmost energy to find a larger market for his product. Yet a dollar saved is a dollar earned and by keeping in close touch with the buying end of the business, so that, when any factory supplies or equipment, are needed, he will know where to buy to advantage, a manufacturer will add greatly to his profits in a few years.

"We do not know why some people should come to the conclusion that we make nothing but pulleys," said the manager of the Dodge Mfg. Co., the other day, "but once in a while we meet them."

"It was only this week that a mill owner called at our works about a machine which we had offered. When he saw *our machine* shop and foundry and the amount of work being carried on he was astonished.

"Said he, 'Why I thought you people made nothing but wood pulleys!'

"He left a five hundred dollar order. We told him we had surely done our part so far as advertising our lines was concerned. He said, 'Yes, but I got the impression—' and so on.

"If there should be any others with the impression," concluded the manager of the Dodge Co., "we would like *them to* call at our Toronto or Montreal offices or send for our catalogue."

OF INTEREST TO COTTON MANUFACTURERS.

Canadian cotton manufacturers as well as United States concerns, will be interested in the "Daily Consular and Trade Reports" for March 23, 24 and 25, issued by the Bureau of Manufactures, Department of Commerce and Labor, Washington.

These reports deal with the conditions of the cotton industry in Austria-Hungary and Switzerland, giving details regarding mills, machinery used, care of workmen, attitude of people toward the industry, etc. These will prove interesting as furnishing comparison with conditions in this country.

Practical Hints for the Factory or Mill Superintendent.

There are so many excellent technical publications issued throughout the world that even the most ambitious superintendent could not afford to read them all to get the cream of their articles. We propose in these pages to give some of the most practical hints and suggestions which appear in the technical press in all countries.

One Barrel of Oil Per Year.

By George H. Kellogg in Power.

The remark of an oil agent, that I "ought to be ashamed to look an oil agent in the face," when I told him that I only used one barrel of engine oil per year on a cross-compound Ball engine developing 400 h.p., caused me to think that Power readers may be interested to know how I accomplished the feat.

The engine is practically inclosed and has sight-feed spindles for all bearings, supplied by a pipe-oiling system connected to an elevated tank. All drips, except for the eccentric shields and the idler-arm drip, lead to the crank-case, from which the piping extends under the floor to a filter. This filter is one of my own "get up"; it is not patented as far as I know. After being filtered continuously for from six to eight months, the oil comes out perfectly clear, only slightly darker in color.

I had previously made three filters, of the "oil through hot water" variety, for other plants in which I had been employed, and was intending to make or get one of the same kind when I took charge of this plant. But at lodge meeting one night, I got into an argument with an oil expert regarding the efficiency of filters in general, and the "oil through water" kind in particular. One of his remarks impressed me very much. It was: "Oil manufacturers will water their stock, but they keep the water away from the oil." He also told me that oil exposed to

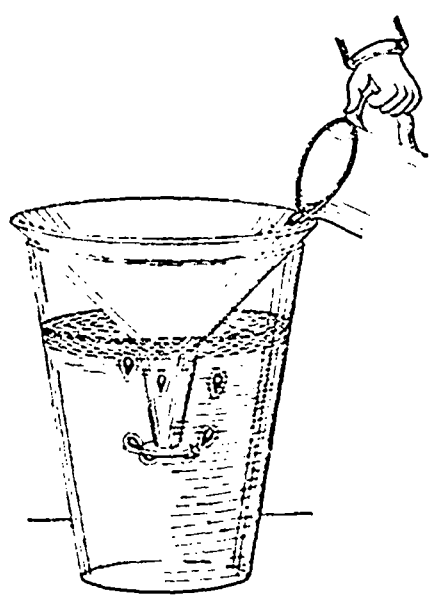


FIG 1

moist atmosphere would absorb from 2 to 3 per cent of moisture; and that the muddy and turbid appearance of oil coming from the ordinary filter was caused by the moisture it contained. By putting the oil up through a filter bed of charcoal, or other absorbing material, the oil would leave the water behind and come out clear again. Oil manufacturers use a filter bed to take the dirt out of oil, but water, no matter how hot, will not take the dirt out.

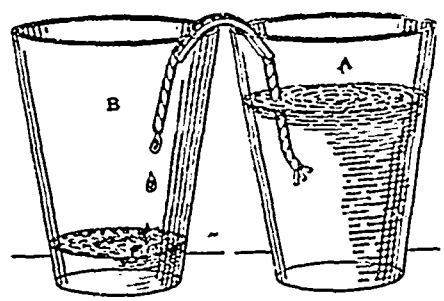


FIG. 2

The next morning I started to experiment. I took a small funnel and soldered a small tin cap to the lower end, to spread the oil out in drops. Then I filled a large tumbler half full of hot water and placed it on the steam chest to keep it hot. I put the funnel in so the tin cap was 2 inches under the water. (Fig. 1) and then put in the dirty oil very slowly. As each drop of oil formed on the upper edge of the cap, to flow through the water, I watched to see it leave some of the dirt behind, but it didn't. After putting through enough to nearly fill the glass, the water was just as clear as when I started. I then put some fine iron filings in the oil, and the film of oil around the filings carried them up through the water, too. That settled me on the "oil through water" proposition.

Then I got another glass and making a tin trough to reach from the inside of one glass over into the other, I put a lamp-wick in the trough (Fig. 2). Then putting the dirty oil in the glass A, I watched results. Soon drops of clean oil formed on the end of the wick in the glass B, and in about four hours I had half a glass of as clean oil as any one ever saw.

Having found a method that produced good results, I worked it out on a large scale. I had a galvanized tank made, 20 inches high by 30 inches diameter, for a clean-oil tank; another of the same diameter and 12 inches high, with the lower rim flanged to set on top of the clean-oil tank, for a filtering chamber; then on top of that another tank 6 inches high, with a flanged rim to set on the filtering chamber with a cover, through which a pipe leads the dirty oil. This is a settling chamber, where the oil separates from most of the water and heavy sediment. See Fig. 3.

From the settling chamber, the oil is fed to the filter chamber by an automatic valve, then through 9 feet of 1-inch wicking. By this means the oil is separated from the rest of its impurities and is carried up over partitions of troughs, draining into the cleaned tank. This filter will take care of one gallon of oil per hour, and so I use about that much oil, although half that amount would be ample for the engine. The extra oil washes off the bearings and keeps them cool, and I am only wearing and losing about one gallon per week.

I find that I cannot use a cheap paraffin oil, nor an oil of high viscocity, as the wicks soon separate the filler or heavy compounding from the mineral stock, leaving a thin oil of poor lubricating quality. I have tried for

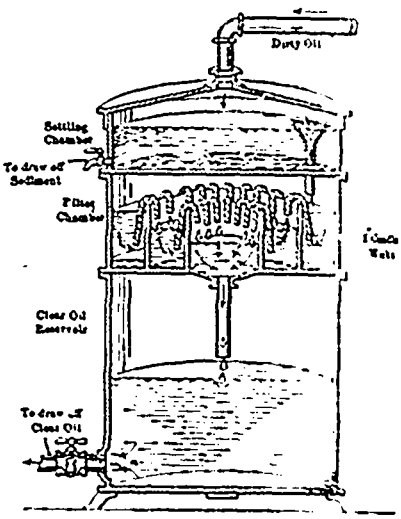


FIG 3

different oils in my system, and always got the oil in on three months' trial; it will run three months, filtering continuously, but I never risk it the other nine.

In putting an oil on trial, I put the whole barrel in the system, and after it has run down to about 25 gallons I put in a gallon of fresh oil each week to maintain the level.

Copper Castings.

From Metal Industry.

Pure copper cannot be cast in sand with considerable difficulty; in fact some deoxidiser is always used. For common castings from two per cent. to ten per cent. zinc is generally added to get sound castings, but for electrical work this is objectionable. The only way to get good electrical castings is to melt pure electrolytic copper in a plumbago crucible under a thick layer of charcoal. When thoroughly melted add two per cent. silicon copper and stir it in with a stick and cast as soon as ready. Practice only can alone will show the correct temperature for casting copper in sand moulds. It depends on the temper of the sand. It must not be allowed to boil, but a fairly high temperature is necessary.

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.

The Care of Belts.

By C. R. in American Miller.

Too much stress cannot be placed on the fact that leather belts cost a good deal of money and should be very carefully looked after.

I have always contended that the first thing to be taken into consideration in the care of belts is to be sure that they are wide and thick enough to do the work intended for them, and that the pulleys are large enough in diameter and face. If a belt is run over a small pulley at a high speed with sufficient lap to insure it adhering to the pulley during all variations of the load carried on the machine, it is sure to be short-lived, provided, of course, it is pulling up to capacity.

Take a piece of wire, for instance, and if you should want to break it and do not have any means at hand for cutting it you proceed to bend it as short as possible. If you bent it in a large circle it would be a long time in breaking. The same with a belt; bend it over a small pulley in a short circle and you have a short-lived belt, but put it on a large pulley and it will be a good friend to you, provided, of course, the quality was there to begin with.

There is no use of saying anything about belt dressings, for they have seen their day. I personally do not believe in putting anything on belts but neatsfoot oil, and the belt should be nice and clean before that is done.

It is well to have two or three extra roll belts about the mill and rotate them each week. Take off one that is in use and put on the extra one. You can then look the belt over, fit it up if it needs it, clean it off in good shape and give it a good oiling. Should it be already full of oil it would be a good plan to put a layer of ground chalk on it, roll it up and lay it away until the chalk has the oil drawn out.

Why do shoe dealers all recommend a person having two or three pairs of shoes to change off. Because they know that the leather wears better if not kept constantly in use, and in so advising their patrons they know they will have better satisfied customers. It is the same thing with leather belts. Take them off and let them rest and they will give you better satisfaction.

In a case of emergency the only thing that I should use is a pinch of finely powdered rosin. It is the most practical thing that I have ever used. If the belt is dusty and dirty it should be cleaned; that sometimes is all that is needed.

Matching the Color of Rolled Bronze in Sand Castings.

From the Brass World.

On some classes of work, both rolled and cast bronze are used, and frequently considerable difference in color is noticed. It is the desire of the makers of such goods to have both kinds of bronze of the same shade of color. This frequently is difficult to do.

Rolled bronze is generally made of 90 per cent. of copper and 10 per cent. of zinc. If tin is used in the mixture, it rarely amounts to over a half per cent. By far the greater proportion of sheet bronze sold consists of copper and zinc in the preceding proportions. It is the cheapest possible bronze mixture.

Foundrymen will readily appreciate the fact that a mixture of 9 parts of copper and 1 part of zinc is too soft for making sand castings, and in order to use it, tin must be added. The color is then slightly changed.

Some cast bronzes cannot be exactly matched in rolled sheet. For example, the well known mixture of 88-10-2 (88 parts of copper, 10 parts of tin and 2 parts of zinc) cannot be rolled into sheet, so that it is impossible to match it. The bronze high in tin have quite a different shade of color from those high in zinc.

The best method of matching rolled and cast bronzes is to make the color of the cast bronze match that of the rolled material rather than vice versa. The reason for this is the fact that while it is impossible to roll the copper, tin and zinc mixtures, they can be cast in sand. If a rolled bronze consisting of 9 parts of copper and 1 part of zinc (90 per cent. copper and 10 per cent. of zinc) is to be matched, the same mixture is made for the sand castings and from 2 to 5 pounds of tin added for every hundred pounds of mixture. The bronze can thus be hardened for every requirement, and as the zinc predominates the color of the rolled and cast bronze will not vary appreciably.

The amount of tin to add will vary with the desired strength of the bronze. The more tin that is added the stiffer and stronger the bronze. For ordinary purposes the following proportions may be used:

ORDINARY SAND CASTING MIXTURE TO MATCH ROLLED BRONZE.

Copper	90 lbs.
Zinc	8 lbs.
Tin	2 lbs.

If a harder casting is desired the amount of tin is increased, but the foregoing mixture will usually answer nearly every requirement.

INDEX TO ADVERTISEMENTS.

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

INDEX TO ADVERTISEMENTS (Continued).

Pages Missing