

PAGES

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THE MANUFACTURER, THE CONTRACTOR AND THE
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MUNICIPAL TELEPHONY IN GREAT BRITAIN.

By F. Dagger, Telephone Engineer, Toronto.

Notwithstanding the attacks of its opponents, municipal telephone systems in Great Britain are increasing in number, and so far the results have been most encouraging. At the present time municipal exchanges are in operation, or in course of construction, at Glasgow, Portsmouth, Brighton, Swansea, and Hull. The Glasgow system which first gave service in March, 1901, has now in operation 11,500 telephones, the average revenue per telephone being \$21. In order, however, to compare this revenue with Canadian rates ten per cent. royalty paid to the British Post-Office must be deducted, which reduces the average receipts per telephone to \$18.90 per annum. This exceedingly small charge to subscribers has enabled the municipality to meet all operating and maintenance expenses, leaving a balance sufficient to provide for interest and sinking fund, and to set aside a surplus of \$17,775.50 for depreciation. This is an exceptionally good showing for two years and nine months' working, and furnishes undeniable proof that municipal telephony is anything but the failure alleged by its opponents. The undertaking which

can pay its way as the Glasgow Corporation Telephone Department is doing, and can at the same time provide telephone users with a service covering 143 square miles at such a low annual cost, has no occasion to fear the assaults of its enemies, and can treat with contempt the opinions of "experts on behalf of the companies who try to split hairs over the particular merits of different types of equipment, or find fault because the original estimates have been exceeded in order to provide a larger reserve capacity for increase of business.

Regarding the quality of the Glasgow municipal system the following statement by Frederick M. Adams in the Brooklyn "Eagle" should be sufficiently convincing:

"The Glasgow telephone service is the best I have ever inspected. Mr. Bennett informed me that statistics showed that the average time required to make a connection was less than fifteen seconds. I made a test on my own account, and called up ten subscribers. Of the nine who responded, the average time from unhooking the receiver to answers from those addressed was fourteen seconds. It should be explained that the telephone booth is practically unknown in the office of a Glasgow business man. The instrument is on the edge of his desk, and the receiver and transmitter are in one piece. This aluminum device is connected with a wire cord, and the customer may converse leaning back in his chair or walking about the room, as he prefers. It is a most decided improvement over the clumsy and antiquated system which yet prevails in most exchanges in the United States."

In speaking of the Glasgow rates Mr. Adams says: "Permit me to make a contrast. I live in a suburb of New York city, and it costs me forty cents to telephone to any part of the city, and fifty cents to get a connection with Brooklyn. Newark, New Jersey, is only twenty-five miles away, and the rate is seventy-five cents for a few minutes' conversation."

The following figures, taken from the report of the Corporation Telephone Department for the year ending May 31st last, make an interesting study, and it will be noted that the financial position of the undertaking is growing stronger each year, so much so that in a few years we may look forward to a reduction of the already low rates:

	1902	1903	1904
Capital expenditure	\$938,415	\$1,319,468	\$1,526,208
Average cost per station (including spare plant and preliminary expenses	171 26	144 65	136 67
Amount borrowed and not repaid	902,809	1,181,136	1,390,336
Gross revenue	129,118	271,400	359,450

	1902.	1903.	1904.
Rentals carried forward to following year.....	60,471	100,882	117,708
Net revenue	68,047	170,518	241,742
Net revenue per station.....	12 53	18 67	20 95
Public telephone receipts	141 23	1,095 75	3,779 12
Working expenses	33,272	77,764	112,760
Interest paid	13,061	32,347	41,575
Sinking fund paid.....	9,545	28,275	40,630
Depreciation fund	1,938	8,250	17,776
Loss on terminal fees remitted to subscribers	3,531	5,508	1,456
Royalty to Post Office..	6,716	16,582	24,384
Total expenditure	66,709	162,268	224,020
Total expenditure per station	12 18	17 79	19 63
	Per cent.	Per cent.	Per cent.
Percentage of Sinking Fund, plus Depreciation Fund, to total expenditure	3.93	4.2	4.67
Percentage of total expenditure to net revenue	91.17	95.16	92.66
Percentage of net revenue to capital expenditure	7.31	12.92	15.44
Percentage of outstanding rentals to gross rentals	13.95	9.91	7.44

The foregoing figures furnish details of the plant as originally estimated for, and that actually constructed from year to year; the figures in the last column representing the capital expenditure of \$1,526,208.

	Original Estimate.	1901-2.	1902-3.	1903-4.
Completed stations	5,250	5,479	9,122	11,405
Partially completed lines	1,200	8,787	7,387	9,065
Switchboard capacity ..	6,050	7,060	10,826	12,062
Pairs of wire in cables..	6,450	14,572	18,171	21,874
Miles of pairs of wire in cables	4,938	11,061	14,029	17,597
Miles of trenching.....	22	94	128	143
Ducts going out of exchange	32	126	135	150
Capacity of ducts in pairs of wires	6,900	27,000	31,000	36,000
Miles of duct	32	104	127	140
Miles of underground cable	31	114	162	206
Poles in ground	2,326	691	1,799	2,544
Iron standards on roofs.	456	228	243	239

It may be added that, with the exception of the new London post-office telephone system, the Glasgow municipal plant is the largest underground service in the United Kingdom.

Second in importance among municipal telephone systems is that of Portsmouth, which was opened in March, 1903. The results achieved with this exchange are interesting as proving how worthless are opinions of experts whose evidence is put forward by the monopolies for the purpose of preventing the establishment of municipal undertakings. At the Portsmouth local Government board enquiry two witnesses were put forward by the National Telephone Company to oppose the granting of borrowing powers to build the plant. These were J. E. Kingsbury, English manager for the Western Electric Company, of Chicago, a "Bell" corporation, and

Herbert Laws Webb, late engineer to the New York Telephone Company (also "Bell"). The following are extracts from their evidence:

Q. In your view, will this business be a financial success?

A. (J. E. Kingsbury): No; I do not see how it can.

Q. Do you think it commercially sound?

A. I think it quite uncommercial.

Q. Are the (proposed) rates remunerative?

A. (H. L. Webb): I do not think that they can possibly be remunerative.

Q. Will the undertaking be a charge on the rates?

A. I think it will be a charge on the rates.

Notwithstanding these gloomy predictions Portsmouth comes out with a surplus such as they did not get on their electric lighting scheme until it had been working several years. The rates charged are, per annum: Unlimited service, \$28.61; measured service, \$17.05 and one cent per outgoing call; or \$12.18 and two cents per outgoing call. The receipts for the year ending March 31st last averaged \$17.54, or, with the post-office royalty deducted, \$15.79 per telephone. The gross revenue was \$29,137, and after paying operating and maintenance expenses, post-office royalty and Government long distance charges the net revenue amounted to \$13,095, or equivalent to a dividend of over nine per cent. on the capital expended, \$141,230. After paying interest and sinking fund a surplus of \$6,136 remained, which has been set aside towards a depreciation fund.

The Swansea municipal exchange has been in operation since August, last year, and, as the report of the year's working is not yet out, it is not possible to give any definite figures, but the management have good reason to anticipate a satisfactory surplus. The rates are the same as at Portsmouth, and the latest available returns show 750 subscribers connected, while 205 additional orders were on the books. The original loan is exhausted, and additional borrowing powers are to be applied for to increase the capacity of the system to 1,500 lines. In connection with this the borough accountant recently prepared a report showing the cost of the present plant for 1,000 lines to be \$98,861, or \$98.86 per subscriber; the first year's revenue to average (including ten per cent. post-office royalty) \$19.50 per telephone; the cost of operation and maintenance, royalties, interest and sinking fund, \$18,316, leaving an estimated surplus of \$1,184. As these figures were based on eight months' actual working, there is no reason to doubt their accuracy.

The Brighton municipal exchange was opened in November last, so there are not yet any accounts available. The rate for unlimited service is \$26.80 per annum; the number of subscribers, 800. The whole of the plant in the town is underground, poles being used only for country services. There has been considerable controversy in regard to the respective merits of the competing services in Brighton. The National Telephone Company has recently installed the latest "central energy" system now in use in the large "Bell" exchanges in the United States and Canada, and the company's officials have frequently asserted that the municipal service was "inferior and

inefficient." As a result of this, A. R. Bennett, the engineer of the municipal system, issued enquiry cards on the subject to all subscribers having the telephones of both systems, and the following is a summary of the replies received:

In favor of municipal service.....	398
In favor of "company's" service.....	5
No difference	12
Satisfied with municipal, but expressed no opinion about company.....	28
Uncertain	4
<hr/>	
Total	447

Eighty-four of the 398 emphasized their verdict by such remarks as "By far," "Most decidedly," "They cannot be compared," "Municipal the only efficient and trustworthy one," "Most emphatically," "Without hesitation," "By a very long way," "Unquestionably," "Without doubt," "Absolutely the very best," etc.

The Hull municipal exchange will be in operation very shortly. The rates are: Unlimited service, \$30.68 per annum; second and subsequent connections of the same firm, \$28; measured service, \$14.61 and two cents per outgoing call. There are over one thousand subscribers, and additional contracts are coming in rapidly. Practically the whole of the members of two of the principal industries of the port have signed municipal telephone contracts.

Municipal telephony in Great Britain has evidently come to stay, and the results up to date will make it exceedingly difficult for its opponents to produce arguments sufficiently convincing to stem the tide in its favor.



—A special correspondent of the Canadian Engineer writes of a trip to Winnipeg, and is enthusiastic as to the prospects of the Canadian West. Winnipeg will probably be more to the trade of the Canadian West than Chicago has been to the trade of the American West, and if the evolution of the Canadian Chicago is unfolded on analogous lines, the industrial history of Winnipeg should now begin to develop. The commercial expansion of Winnipeg in common with most towns of Manitoba and the North-West is proceeding with great rapidity, and if manufacturers of eastern Canada wish to acquire and hold their due share of this trade they should get into closer touch with the West than some of them seem to do. A great deal of business that might be done with eastern Canadian firms is being grasped by manufacturers in the mid-western States. The industrial east should be linked with the commercial west, and if this is not accomplished it is because many firms in the older Provinces are not aware of what is transpiring in the great western plains of their own country. Every manufacturer of Ontario and the Provinces to the east who aims at doing a trade beyond the confines of his own Province should take a trip to the West and see for himself how substantial is the progress that has been made there in the last ten years.

—It is satisfactory to learn from South African Mines, the leading mining and industrial journal of South Africa, that the experiment of introducing Chinese labor into the Transvaal mines promises to be a practical success. The mine managers have closely watched the work of the first instalment of Chinese laborers, and reports coming to the President of the Chamber of Mines enable him to state that the raw Chinaman is a distinct improvement upon the raw Kaffir. By the end of September there will be 11,000 imported laborers in the mines of Johannesburg, and our contemporary confirms the predictions of the mining authorities that the Transvaal is again on the high road to prosperity. An assurance of this may be taken from the fact that the output of the gold, diamond, coal and silver mines of the colony for the first half of 1904 makes a total of £8,672,627 sterling, while the net profits in the same period are estimated at two and three-quarter million pounds sterling. This is encouraging news after the poor trade reports of the past year, and, as there is a large prospective market for Canadian machinery and manufactured goods in South Africa, exporters from this market will do well to give attention to these colonies. Our contemporary is of opinion that, other things being equal, a preference will be given to Canadian goods over foreign goods, but even without this friendly sentiment and the actual advantage now given to Canada under the South African preferential tariff there is a great future for Canadian products in that quarter of the world.



—In another part of this issue will be found the results of an investigation by a representative of this journal into the progress of acetylene gas lighting in Canada, instancing more particularly the case of North Bay, Ont. There appears to have been more progress in the wide-awake west than in eastern Canada in this field of enterprise. There is a prevailing opinion among those interested as operators of lighting plants that many more towns would be using acetylene if the price of calcium carbide were reduced. Theoretically, a pound of pure carbide makes five feet of gas, but in practice only about four feet is got from the average quality furnished, and adding freight to the cost of carbide the price will average \$72 to \$75 a ton. This makes the cost rather high to offer a very attractive field for investment in those towns in which acetylene would have to meet an established rival like coal gas or electricity. In a growing young village or town where no other public lighting has been introduced the advantages of acetylene over coal-gas or water-gas in several respects appear to be pretty clearly shown in our report. For cooking purposes coal-gas is cheaper, though strong claims are made for one or two new types of acetylene gas stoves now being put on the market. If these claims can be proved in practice, then the day is not far distant when acetylene will largely supersede coal-gas for lighting, and be a competitor also in cooking, provided that the price of carbide is reduced. In this development there will still be a keen competition between the two gases, for it will be admitted, in view of the value of the by-

products of a coal or water-gas plant that those establishments could still stand a considerable cut in the profits on the gas department of their output. Evidence of these possibilities is furnished in the case of Australia, whose imports of carbide this year are expected to be over 1,100 tons, according to the Canadian commercial agent there, owing to the fact that the German carbide combine has been broken. German carbide is selling on that market lower than has ever been known, and it is said that some of it is now coming into Canada in spite of the surtax on German goods. The acetylene light, it may be added, has had its difficulties to overcome apart from the high cost of carbide. Accidents have happened, because most of the experimental lighting done throughout Canada, as well as in other countries, in the past few years, is by isolated plants, whereas practically no coal-gas lighting is done except on a large scale and for public lighting, in which case, unlike the isolated acetylene plant, there is always some one whose sole work is to run the plant and guard against accidents. We can imagine what would happen if the coal-gas business was carried on by the same number of isolated plants, left to casual attendance, or in some cases to run themselves, as is the case with private acetylene generators. But the record of town lighting plants of the acetylene class already compares favorably with coal-gas ones, both in Canada and in Europe, and time will improve this record. Considerable progress has been made in Canada in train lighting by acetylene gas. This gas was introduced several years ago on the Canada Atlantic, and the Canadian Pacific Railway Co. is adopting it extensively on its system, as is also the Canadian Northern. Over sixty trains, comprising about 360 cars, on the C.P.R. are now regularly lighted by acetylene, and the light is as satisfactory to the train hands as it is to the patrons of the railway. Another successful field for acetylene is in the lighting of buoys along our rivers and lakes. The lighting of the St. Lawrence buoys during the past year by this gas has been found most satisfactory, and navigators state that the light penetrates a greater distance, especially in misty weather, than any other light yet used. In consequence of this favorable report a factory has been established by the Dominion Government at Prescott for the manufacture of acetylene gas buoys for the whole system of inland and sea coast navigation.



CANADIAN ASSOCIATION OF STATIONARY ENGINEERS.

The 1904 convention of this body was held in Hamilton, Ont., on August 16th and 17th, in the council chamber of the Hamilton Court House.

President H. E. Terry replied to an address of welcome by Mayor Morden, who was introduced to the Association by ex-Ald. R. J. Pettigrew, of Hamilton No. 2. The Association was then welcomed by Hamilton, No. 2, by their president, J. Ironside.

The following delegates and executive officers answered the roll call: H. E. Terry, president; J. M. Dixon, treasurer; W. Inglis, secretary, all of Toronto; J. Ogle, Brantford, conductor; F. Sculthorpe, Hamilton, door-keeper; delegates, Toronto, No. 1, A. M. Wickens, G. C. Mooring, W. McGhie, W. Outhwaite. Brantford, No. 4, J. Ogle. Berlin, No. 9,

W. Oelschlager, Chatham, No. 21, E. Grandbois. Dresden, No. 8, W. Steeper. Waterloo, No. 17, N. Beam. Hamilton, No. 2, W. F. Crockett, W. A. Sweet. Vancouver, Brockville, and St. John, N.B., delegates did not attend, and vice-president, John Uttley, was also absent.

After the reading of the minutes of the last meeting, the president's address, secretary's report, and the treasurer's statement were read.

The president's address, after welcoming new members, proceeded as follows:

Clause 1.—Early this year it was found that Toronto No. 18 were having great difficulty in getting out their members to the meetings, and that there was great danger of them becoming defunct. After several meetings with the brothers, it was decided to effect an amalgamation with Toronto No. 1, and on March 8th, No. 18 surrendered its charter, and the members were accepted in Toronto No. 1, and in view of the fact that No. 1 assumed the risks of No. 18, the cash in possession of No. 18 was turned over to No. 1.

I am pleased to report that on May 16th an Association was instituted in Chatham to be known as Chatham No. 21, with a charter of twenty-one members. Also on July 26th an Association was instituted in St. John, New Brunswick, to be known as St. John No. 22, with a charter list of 43 members. Both of these Associations are reported as doing well, and are in a fair way to become useful additions to our order.

I am pleased to report that Ottawa Association will be in working order again before the end of the year.

Clause 2.—I would recommend that you take into consideration the matter of reducing the per capita tax of the Associations that are too far distant to be represented at this convention. Also that those Associations who do not pay sufficient tax to cover their representative's expenses, should pay one-half of his expenses.

Clause 3.—I would also recommend the advisability of meeting every two years instead of annually.

During the year the secretary's correspondence and enquiries regarding the Association have been very large, the small amount of advertising done in the Canadian Engineer and the Electrical News having brought forth fruit abundantly.

The secretary's report submitted subjects for consideration, as follows: The correspondence during the past year has been very large. The advertisement in the Canadian Engineer and the Electrical News has brought our order more prominently before the public and engineers all over the Dominion, and I would recommend that the work be continued.

Clause 1.—I would ask you to consider the numerous enquiries about the forming of new branches. I am of the opinion that if some system were put into use we would have no trouble in organizing branches all over the Dominion and making this order what it should be—the leading society of engineers in the Dominion. A great many ask for examination papers and certificates of competency. This we, of course, have not got in our order, but I would strongly recommend that a board of examiners be appointed by this convention, said board to have power to examine all members of the C.A.S.E. and grant them certificates of competency, according to their qualifications.

Clause 2.—Another matter which should be taken into consideration is the establishing of a sick benefit, controlled by the executive. This could be done quite satisfactorily by paying a limited number of weeks per year and by grading the membership according to age or by paying a flat rate per year.

Clause 3.—The financial standing of your executive should receive your attention. We should either raise our per capita tax or pay less mileage and per diem. I would recommend that the per capita tax be raised to \$1 per year.

Clause 4.—I would also recommend that a representative be appointed in each province in the Dominion, said representative to receive applications for membership and do the business of the order in his province.

Clause 5.—I am pleased to say our membership has increased during the year; number of members last report,

258; admitted by initiation and new branches, 58. During the year twenty-two members were suspended—many of whom will return—leaving our present membership 294. If every member would press the work he could secure many applications.

Clause 6.—The receipts and expenditure for the year are as follows: Receipts from all sources during the year, \$190.50; expenditure during the year, \$68.10; leaving a balance of \$122.40. This, you will see, will need to be carefully dealt with to leave the executive some funds to start the year's work with.

On motion of G. C. Mooring, seconded by W. F. Crockett, these reports were given a special committee for distribution to the various standing committees.

The following standing committees were appointed:

Mileage—N. Beam, W. Steeper.

Ways and Means—R. J. Pettigrew, E. Grandbois, W. Outhwaite, W. A. Sweet, W. McGhie.

Good of the Order—G. C. Mooring, W. F. Crockett, A. M. Wickens, J. M. Dixon, W. Steeper.

Auditors—W. A. Sweet, J. Ogle.

The following notices of motion were given:

G. C. Mooring: "That the word steam be substituted

the Hamilton Cataract Light, Power and Traction Co., Limited, where W. A. Sweet escorted them through.

The International Harvester Co.'s works were also visited, where, in the absence of George L. Rice, Messrs. James A. Publow and W. R. Dunn took the party in charge.

A special car was placed at the disposal of the Association by the Hamilton Street Railway Co. during the afternoon and evening, a courtesy which was greatly appreciated.

In the evening, the visitors and their friends were entertained at Cotter's Hotel, on Hamilton Mountain, by the local Association, and an excellent programme was carried out and refreshments supplied.

Robert Baker, engineer, of 101 Wilson St., Hamilton, read a paper describing his Patent Perfect Combustion Automatic Machine. There have been many devices patented and placed upon the market, says Mr. Baker, but not one of them will separate the impurities from the pure gases, and none will work without artificial draught.

The appliance described works automatically, and is fed from the rear end of the boiler. The coal is conveyed forward into the generator thence to the cooking chamber,



President, F. J. Sculthorpe.



Vice-President, W. A. Sweet.



Secretary, W. Inglis.

for the word stationary, making the name of the Association in future, The Canadian Association of Steam Engineers."

J. M. Dixon: "That the preamble of the Constitution be amended, to read in a manner which would appeal more strongly to the mind of the enquiring workman."

The special committee on distribution reported as follows: "That the secretary's report had been dealt with as follows: Clauses 1, 2, 4, 5, and 6, were referred to the Committee on the Good of the Order, and clause 3 to the Committee on Ways and Means. The special committee was then discharged.

After introducing to the Association the delegate from Chatham, the meeting adjourned until 2.30 p.m.

At the afternoon session, the Committee on Ways and Means report on the president's address was received, and productive of much discussion, but it was finally adopted as read.

The report of the auditors was also received and adopted.

The Mileage Committee presented their statement and same was accepted.

F. B. Uttley, of the Goldie & McCulloch Co., Limited, was invited to address the convention, and in a happy manner he illustrated the difference between the old-time engineer and the present product now supplied to the manufacturers in Canada, through the instrumentality of such organizations as the C.A.S.E. He offered, on behalf of his firm, hearty co-operation in their efforts to educate and raise the standard of the Association's membership by supplying them with information through correspondence or by a visit to their works in Galt, Ont.

The Association thanked Mr. Uttley for his promise, and adjourned to visit the sub-station on Victoria Ave., of

which is formed into the bridge wall, where the coking takes place, and the gases and smoke are given off and conveyed rearwards by means of a fan. In their travel rearward, the impurities are deposited into receivers in liquid form. This property is a by-product, such as is given off in gas factories. The pure gases are conveyed forward at one-half pound pressure and fed into the bed of burning coke, and at the same time fresh air is being supplied to the fire through arches provided for that purpose through the bridge wall and under the grates, which allows the chimney to perform its proper functions. The arches through bridge wall for supplying air extend to the rear end of the boiler.

The object of the invention is, first, to provide an apparatus adapted to extract and burn gas and smoke from soft coal; second, to provide means whereby gas and smoke from soft coal may be utilized and generated into heat for heating purposes; and third, to afford facilities whereby the apparatus may be adapted to perform its functions in connection with boilers, furnaces, stoves, and other heat generating apparatus. A blue print showed the mechanism used.

Amongst those taking part in the musical programme were Pipers Munro, Ross and McGregor. Songs were rendered by Messrs. J. M. Dixon, W. A. Sweet, J. T. Webster, H. E. Terry, and speeches by friends of the Association and other visitors.

At 9.45 a.m., August 17th, the meeting was called to order by the president, and a telegram was received from the International Union of Steam Engineers, 152, conveying greetings, and asking the co-operation of the Association in procuring a compulsory license law at the next session of the Ontario Legislature. The convention unanimously pledged their support, and sent a reply to the secretary of the union to that effect.

The report of the Committee on the Good of the Order was then received, and clause 1 was accepted with a recommendation that a clause be added to the Constitution which would cover all future amalgamation of subsidiary lodges. On a vote this was lost.

Clause 3 was also voted down, and the rest of the president's address, with slight alterations, was accepted.

The secretary's report was also taken up, clause by clause, and clauses 1, 2 and 4 were not entertained, but the rest of the recommendations contained in this report met with hearty support.

In view of the change in the name of the Association, it was recommended by Messrs. Wickens and Sweet, that in printing the new Constitution, all changes and amendments that have been made since the last Constitution, were ordered to be inserted, and this was approved of and the following preamble will take the place of the old in the new Constitution:

"This Association having for its object the furtherance of mechanical and expert training of its members, endeavors to strengthen itself by encouraging a higher standard of skill among them.

"In the everyday work of the engineer, there comes an unconscious addition to his past experience by his application to new phases of his labor arising from the increased demands on the uses of steam. How best to acquire the knowledge to meet this march of events in our profession



Doorkeeper, E. Grandbois.

is the principal object of this Association. By means of instructive meetings and circular letters we intend to equip all members, and especially those who may locally be placed at a disadvantage. Fraternity is the spirit of love, and should guide our relations in life. Our labor is so closely identified with capital, that we wish to concede to it the position its commercial interests demand; but recognizes the identity of interests between employer and employee. Our intercourse should be marked with a preference for the furtherance of our progressive life, avoiding all subjects, such as politics or religion, which are man's own private thought."

The meeting was then adjourned to accept the invitation of the Hamilton Lodge for a trip to the other part of the Mountain to view Hamilton from the tower platform of the Mountain View Hotel, and they met again at 2.30 p.m.

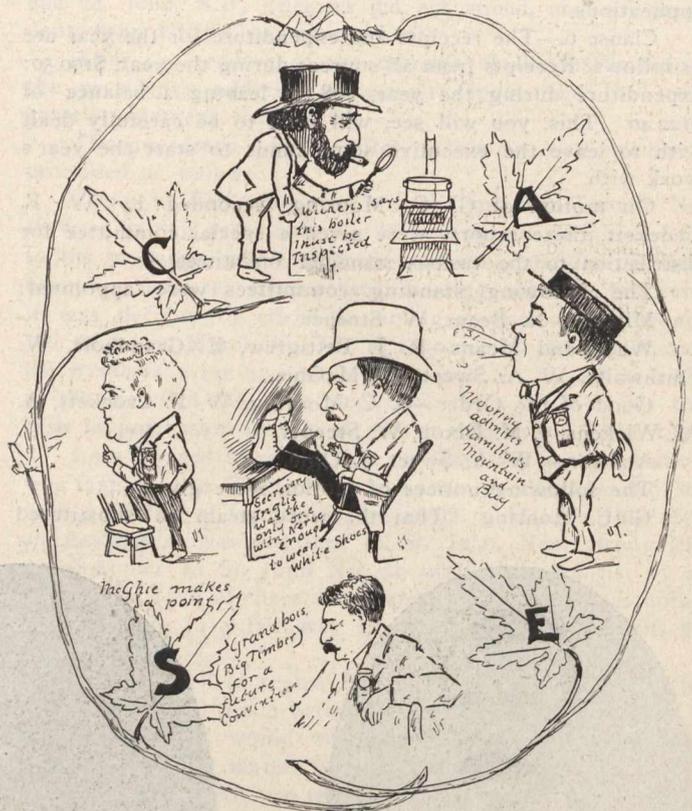
The first business was the acceptance of a recommendation by Messrs. Wickens and Dixon, that the Executive should make arrangements for the reading of at least two papers on mechanical subjects, and at least one on social relations at their next annual meeting.

The election of officers was then proceeded with, resulting as follows: President, F. J. Sculthorpe; vice-president, W. A. Sweet; secretary, W. Inglis; treasurer, J. M. Dixon; conductor, W. Outhwaite; doorkeeper, E. Grandbois.

Voting for the next place of meeting gave the honor to Chatham, and the thanks of the Association was voted to the city press, the Hamilton Street Railway Co., International Harvester Co., the Hamilton Cataract, Light, Power and Traction Co., Limited, and also to the Hamilton Association for courtesies extended.

Grants of \$2 to the caretaker of the Court House, \$25

to the executive secretary were made, and the executive secretary was authorized to send to the St. John, N.B., and Vancouver Associations copies of the Canadian Engineer, containing the report of the convention.



The above group of sketches are from the pen of F. B. Uttley, of the Goldie & McCulloch Co., Galt, who kindly acted as special artist for the Canadian Engineer at the Convention.

A vote of thanks was given A. W. Smith, of the Canadian Engineer, for his services during the convention, and the retiring president, H. E. Terry, was presented with the past president's jewel, and a hearty vote of thanks for his efforts on behalf of the Association, during his term of office, to which he responded with much feeling. With a few words from the new president and others, the convention came to a close.

The following is a list of the officers in the subordinate lodges:

Toronto, No. 1—President, W. Outhwaite; vice-president, W. McGhie; recording secretary, H. E. Terry; financial secretary, W. J. Webb; conductor, G. Black; doorkeeper, J. Marr; treasurer, G. Moseley.

Hamilton, No. 2—President, J. Ironsides; vice-president, A. Stewart; secretary, W. F. Crockett; treasurer, W. Cornish; conductor, R. C. Pettigrew; doorkeeper, J. Elliott.

Brantford, No. 4—President, A. Ames; vice-president, T. Pilgrim; secretary, J. Ogle; treasurer, C. Walker; conductor, A. McKinnon; doorkeeper, F. Fordham.

Dresden, No. 8—President, S. M. Seager; vice-president, W. Jamieson; secretary, W. Burnett; treasurer, F. M. Stuper; conductor, T. King; doorkeeper, W. Bear.

Berlin, No. 9—President, J. Walker; vice-president, J. Schneider; secretary, J. Heyd; treasurer, W. Geidt; conductor, J. Koehler; doorkeeper, A. Arndt.

Brockville, No. 15—President, W. Robinson; vice-president, J. Grundy; secretary, A. M. Lurkington; treasurer, W. F. Chapman; conductor, V. Hannon; doorkeeper, C. Van Norman.

Waterloo, No. 17—President, G. Beam; vice-president, J. Wendell; secretary, N. Beam; treasurer, J. R. Utley; conductor, J. Nichin; doorkeeper, T. Robertson.

Vancouver, No. 19—President, G. H. Flower; vice-president, J. R. Badger; secretary, W. Keith; treasurer, A. B. Ashworth; conductor, L. Robins; doorkeeper, M. Sprague.

Chatham, No. 21—President, E. Grandbois; vice-president, W. Condon; secretary, Charles Kelley; treasurer, W. Prout; doorkeeper, A. Trott; conductor, J. Buck.

St. John, No. 22—Past president, W. R. Murphy; presi-

dent, E. W. Graham; vice-president, A. Masten; recording secretary, S. Dunham; financial secretary, F. Watson; treasurer, D. A. Halfield; conductor, W. McHarg; doorkeeper, F. Hayter.

Convention Notes.

A member of Hamilton No. 2 placed his steam yacht at the disposal of delegates.

Eureka Mineral Wool Co., of Toronto, have a souvenir pen holder, which they will send to members on receipt of name and address.

The representative of the Syracuse Smelting Co., Montreal, and Toronto, was one of the speakers on the evening of the 16th. Souvenir match boxes were promised from this firm, but did not arrive before the close of the convention. Delegates will please write for them, or call at their exhibit in Machinery Hall at the Canadian National Exhibition.



"TUBE MILLS" IN THE JOHANNESBURG MINES.

From "South African Mines."

To make 100 stamps and a cheap supplemental grinding plant faithfully represent a crushing capacity of 400,000 tons per annum is one of the self-imposed tasks to which Rand engineers have assigned themselves. They have sought and are obtaining the co-operation of what David Gilmour referred to as "the Commercial Engineer." While Mr. Denny is planning high speed heads for the Cinderella Deep, and succeeding with very important innovations at the New Goch, A. M. Robeson, like Mr. Lenz, of Reunert & Lenz, is assiduously devoting himself to perfecting tube mills first introduced into South Africa by Fraser & Chalmers for cement making purposes. All the other engineering firms are no less active in striving to meet the demand for greater efficiency in the mill, and when this has been assured there will probably be requisitions for quick delivery of more hoisting-engines capable of bringing enough golden grist to these reinforced mills.

A few weeks ago South African Mines presented details of the anvil blocks at the Village Deep mill. We are now enabled to present other significant, if not sensational, facts and figures, relative to tube mills and what they promise to do for Rand metallurgy. It will doubtless be recalled that a net gain of 15 per cent. in crushing capacity is confidently anticipated from these new mortar-box foundations, and when it is stated that the firm of H. Eckstein & Co. are anticipating a further increase of 100 per cent. from the use of tube mills in the ratio of four secondary crushers per 100 stamps, some idea of the future metallurgical aspect of these fields may be obtained.

The mining talent of the Rand has for a long time realized that very large tonnages will have to be treated in the epoch of deeper level mining. In this respect the limitations of the stamp head have been ever unpleasantly evident. The ordinary 100 stamp Californian mill under general circumstances will deal with 180,000 tons per annum, and with anvil block mortars it is calculated that this capacity may be brought up to 207,000 tons per annum. Now in the proportion of 25 heads per secondary mill, it is expected to get through 400,000 tons per annum from this same 100 stamp battery. Briefly, this means that the outputting capacity of the Transvaal may be doubled at a very small rate of cost, that this increment will be mostly profit, and that lower grade and deeper areas than those at present considered by the mining world will be brought within the role of profitable mining.

For the first six months of this year practically 4,000,000 tons have been crushed by 4,913 Transvaal stamps. We are erring on the safe side when we say that under the new principles eight million tons would be treated under similar circumstances, that the gold yield would have approximated fifteen millions instead of between seven and eight millions, and that profits would be considerably more than doubled. These figures speak for themselves in an unmistakable manner, and they may be accepted as emanating from an exceptionally sound authority. It is unnecessary to venture upon calculations based upon our previous estimate of 15,000

stamps in 1909. By that time batteries and tube mills may be displaced by something better.

The fact that the most easterly subsidiary of the Rand Mines group, although dropping the full hundred stamps erected, is receiving a complement of eighteen hundred Chinamen, finds solution in this development together with the projected programme that has been sketched for that property. One tube mill is at present running and is doing the work of an additional ten stamps, whilst it may be expected that the relation between stamp and secondary breaker will be brought up to 25 stamps per tube mill when a fully-equipped plant on this new principle with coarse crushing is requisitioned. The average price of such a mill is about £1,000, and when we accept this figure in comparison with the 100 per cent. increase to be expected in 25 stamps, we must realize that the metallurgical engineering has by no means reached its limits to-day, nor is it likely to for some time to come.

What Tube Mills Are.

For the information of the laity, it should be explained that the "tube mill," or what in some countries is termed a "grit mill," is made in various diameters and lengths, and consists of a cylinder of steel plate with a head in each end. There is an inlet in one head and an outlet in the opposite head, the inlet and outlet passing through hollow trunnions fastened to the ends of the cylinder, which trunnions revolve in heavy bearings. The cylinders are usually completely lined with sections of chilled cast iron or steel, and are filled nearly half full with what is termed "iceland pebble." This pebble consists of glacial or water worn flints. The material to be ground is fed in through one trunnion and passes out the opposite trunnion, and the amount of water fed into the inlet governs the quantity of material that is discharged from the outlet. The mills are driven from one end by gears. The cylinders vary in size from 2 ft. in diameter by 10 ft. long to about 7 ft. in diameter by 30 ft. long. The one at the Glen Deep is 5 ft. in diameter by 22 ft. long. This latter would cost about £1,200 landed on the mine. Grit mills have been used for many years, but, we believe, never before in connection with regrinding wet products from stamps. Their usual use in the past has been as a dry grinding mill, such for instance, as grinding cement clinker, in which case the mills are sometimes lined with wood, and sometimes with bricks made of silica. One mill of the size used at the Glen Deep might be sufficient to grind the portion of the pulp necessary to be ground from 100 stamps. Mr. Robeson, whose technical work is in the direction of perfecting, of supplementing present plants, is understood to be engaged upon further tube mill tests, and it is believed a very great economy will be effected.

Where the Tubes are Used.

At the Pretoria cement works, where dry-crushing is in vogue, the first two tube mills adopted in this country are at work. To G. A. Denny, consulting engineer to the General Mining and Finance Corporation, belongs the credit for first introducing the flint mill into Transvaal mining at the New Goch. At this property the device has proved a notable success. The future Denny idea, as expounded in this journal, has been to slime all products from this mill; at the Glen Deep, where more tubes of improved pattern will be provided, concentrates are to be paid attention to as they are at the New Goch at the present moment. Crushing will be practised with a mesh eight or nine times coarser than that now in vogue, and though increased secondary treatment plants will be necessary, the immense increases in profits that will be possible need no discussion. At the Sheba one of these mills is at work, whilst another is employed at the Treasury, and an instance of the advent of tube mills outside of South Africa is forthcoming in the Waihi gold mine of New Zealand. Discussing the new departure, Mr. Lenz, of Reunert & Lenz, who represent the Davidsen mills, which have recently been the mediums for extensive experiments, says that ten tons per day per stamp is the new milling standard. The secondary breaker he considers a vital element in crushing, and in the rivalry between Rand firms there is the certainty of larger profits, more dividends, prosperity in every department of industry and commerce.

INDUSTRIAL NOTES.

The Brantford Gas Co. is now supplying natural gas from Bow Park.

The Down Draft Furnace Co. are erecting a large building in Galt.

The new bridge across the Fraser at New Westminster has been formally opened.

A large addition to the Shurly & Dietrich Saw Works, Galt, will be built of cement.

Guelph will shortly make extensive improvements in its city hall and market buildings.

The Consumers' Gas Co., of Toronto, has authorized the issue of \$1,500,000 new stock.

The C.P.R. oil shed at Brandon, containing sixty-three barrels of oil was destroyed by fire.

It is said that the Canadian Pacific Railway will build a large summer hotel at Bobcaygeon.

The Nova Scotia Steel Co. expect to blow in the new blast furnace before the end of August.

The Bell Telephone Company will erect a fifty thousand dollar addition to their offices in Winnipeg.

The dam of the MacLaren mill, in Wakefield, will probably be improved, and additional power developed.

The C. C. Turner Co., grain merchants, of Winnipeg, are building a grist mill and elevator at Melfort, Sask.

The Ottawa Steel Casting Co. are enlarging their plant by an addition of about eighty square feet, one storey high.

The Bank of Montreal will purchase the Queen's Hotel, Winnipeg, for \$220,000, and will erect bank buildings on the site.

Gilbert Plains, Man., has passed a by-law to raise \$3,000 to help the Gilbert Plains Milling Co. build and equip a mill.

There is talk of a new gas company entering the field in Montreal in opposition to the Montreal Light, Heat and Power Co.

Orillia has given a contract for a timber dam to Joseph Battle, of Thorold, the work to be finished by October 1st.

Natural gas was recently struck in the vicinity of Sheep Creek, 21 miles south of Calgary, while excavations were being made for coal.

A large addition is being built at the factory of the Hespeler Furniture Company. The firm now employs about 75 hands.

Dixon's foundry at Collingwood was destroyed by fire on July 27th. Loss, about \$8,000; insurance, \$2,000. Will rebuild immediately.

The Brantford Beaver Oil Co. recently acquired 600 acres in Moore Township, seven miles from Petrolea, and has struck two gushers.

It is estimated that the steel rail mill of the Dominion Iron and Steel Co. will be producing 500 tons of rails per day by the end of the year.

C. N. Oke, expert well-borer, of Petrolea, says oil is to be found near Bowmanville. Arrangements are being made to sink borings immediately.

The Massey-Harris plant in Brantford has been closed down. It is not expected that operations will be commenced before November or later.

The Canada Foundry Co. has closed a contract with the Canadian Northern Railway for the bridge over the Saskatoon, northwest of Battleford.

W. H. Gardner has a contract for new city buildings for Edmonton, buildings to be completed by December 1st. The contract is worth about \$10,000.

The first well of the Detroit and Leamington Oil Co. was recently shot. The well was drilled to a depth of 1,072 feet, and within an hour after being shot had filled up with oil to a depth of 500 feet. The owners, the Leamington Oil Co., Limited, is composed chiefly of Ypsilanti people.

Progress is reported in the building of the Dominion Observatory at Ottawa. It is thought that the fifteen-inch telescope will be mounted by October.

The saw and planing mill at Morristown was destroyed by fire with a loss of \$5,000, partly insured. The building also contained a sash and blind factory.

The Cramp Steel Co. has turned over to the Northern Iron and Steel Co. its quarry lands and rights to the bonus of \$60,000 from the town of Collingwood.

The Dominion Coal Co. are about to secure an extensive water frontage at Halifax, where they will build large coal pockets, and extend the present piers.

The first regular importation of ore from Wabana, Nfld., for the Nova Scotia Steel and Coal Co., was made on August 2nd, when 3,500 tons were landed.

Tenders are asked for the construction of a steel bridge 84 feet in length across the Madawaska, at Calabogie. Bridge to have stone or concrete piers.

The Reid-Newfoundland Co. is just completing a machine shop at St. John's which is 49 x 109 feet. The company is about to erect a car-building shop 42 x 216 feet.

The Dominion Tar and Chemical Co. are considering the erection of an extensive plant for the creosoting of timber in Cape Breton. Louisburg is spoken of as a site.

Messrs. Peter Lyall & Sons, contractors, have purchased a block of land at Longue Pointe, near Montreal, comprising 300 acres, on which they are to erect a cement factory.

An old malt house, at Brockville, recently acquired by the Dominion Government for the marine works of the St. Lawrence, collapsed burying four workmen. None were killed, however.

A local paper reports that a nail manufactory will locate in Sydney as soon as there is some definite assurance that the industrial situation in Sydney is in a settled condition.

The pattern-room of the Albion Iron Works, Victoria, was destroyed by fire on August 9th. It was recently equipped with modern machinery, and the loss is estimated at from \$60,000 to \$80,000.

The Berlin piano factory has been closed down, due to the foreclosure of a \$20,000 mortgage on the factory and plant, and a \$7,000 chattel mortgage. The business will be advertised for sale.

The Londonderry Iron and Steel Company have purchased from the Torbrook Iron Company all their deposits at Torbrook, and will commence to ship iron ore at once to their plant in Londonderry.

Wm. Price's lumber mills at Trois Pistoles, Que., were damaged by fire to the extent of \$15,000; loss covered by insurance. The damage was principally in the engine-room and interior of adjoining room.

James Munro, managing director of the International Automatic Machine Co., and the Munro Wire Works, of New Glasgow, N.S., has visited Winnipeg with the view of establishing a branch house there.

Manager Shields, of the Lake Superior Corporation, states that the steel works will resume about September 1st. This will involve resumption of work at the Helen mine, and the operation of two smelters.

The Singer Manufacturing Company have awarded to Messrs. Jas. Stewart & Co., of New York, the contract for the erection of their buildings in connection with their removal from Montreal to St. Johns, P.Q.

There is talk of the erection of another palace hotel in Toronto. George Graham, proprietor of the Iroquois Hotel, is said to be behind the proposition, and the site of his hotel, with adjoining land, would be the site of the new house.

A peculiar explosion took place at Pillow & Hersey's Rolling Mills, Montreal, last month. A mass of iron dross being removed from the blast furnace fell into a pool of water and exploded, the fragments being hurled three hundred yards. Three or four people were more or less injured, and small fires were started.

Meaford has granted a loan of \$20,000 to the Meaford Wheelbarrow Co., of which James Cleland is president, for the purpose of enlarging and extending their plant. The establishment will employ upwards of one hundred men the year round.

The city council has granted the Canadian Typograph Co., Windsor, Ont., ten years' exemption from taxation provided the company erects a factory, employs twenty men and pays the tax rate on the \$5,000 worth of machinery now owned by the company.

In a recent case of damage by backwater against the Gananoque Water Power Co., the judge suggested that the company make an additional outlet of 141 square feet in the dam, to be opened in time of flood. The directors have decided to adopt the suggestion.

Dr. Adams, of Embro, has made an assignment. As he is the principal owner of the Woodstock branch of the Marble-Swift Automobile Co., it is thought that the factory may be closed. The failure is not a serious one, as there are assets far exceeding the liabilities.

A \$75,000 sub post-office will be erected on Windsor Street, Montreal, to handle incoming and outgoing mails. It will be connected with the main office by a system of pneumatic tubes which will cost \$55,000. Twenty-five thousand dollars is being spent in improvements in the main post-office.

The Department of Railways and Canals is erecting a wood-working machine shop at Cornwall, for the manufacture of lock-gates and furnishings for the canals on the upper St. Lawrence. The building will be 92 by 47 feet, constructed of steel faced with pressed brick. J. C. Johnstone, of Cornwall, has the contract.

The Ewart Carriage and Wagon Works, Limited, Toronto, are to be wound up, on the petition of the Dunlop Tire Co. The company was incorporated in February, 1903, with an authorized capital of \$100,000, divided into 1,000 shares, of which 294 were subscribed for and 133 paid up. The petitioners have an unsatisfied judgment of \$193 against the company.

Brown Bros., Limited, wholesale stationers, of Toronto, who were burned out in the fire of last April, lost their temporary premises by fire on August 21st. The Queen City Curling Rink, which they occupied, was completely gutted, with all its contents. The loss to the company is estimated at \$80,000, covered by insurance. The Curling Club and St. Paul's Church are also losers.

Col. T. W. Symons, a member of the advisory board of consulting engineers of the Erie Canal enlargement project, says cement will be used in the construction of locks. It is better than stone, and its use will save several millions of dollars. Col. Symons has just returned from the Trent Valley Canal, where he found the stone parts leaky, but the cement portions beyond improvement.

Cement is beginning to arrive at Fort Frances for the construction work of the Backus Syndicate. 40,000 barrels is the amount of the first order. A power house and wing dam capable of furnishing 1,000-h.p. will first be erected. This will be used for light and power during the work of construction, also for lighting the two towns if they wish it, and will be ready about the first of March. Work will be pushed day and night.

One of the largest cold storage plants in Canada is being erected in Canso, N.S., the contract having been awarded to Mr. James Rice, of North Sydney. The building is to be of brick, 80 by 125 feet, and so arranged as to be extended, if found necessary, later on, and to cost between \$40,000 and \$50,000. The Dominion Government has granted a subsidy of \$20,000. It is expected the plant will be ready for the reception of bait by the 1st of November.

The Canadian Westinghouse Co., who are erecting large shops in Hamilton, intend to heat their buildings by the blast or fan system of heating and ventilating. The contractors for the erection of their buildings, the Westinghouse Church, Kerr & Co., of New York City, have

placed the order for four large fans with Sheldon & Sheldon, of Galt. The four fans have a combined capacity of handling 152,000 cubic feet of air per minute.

The Canada Foundry Company have closed a contract with the Canadian Northern Railway for a bridge over the North Saskatchewan, north-west of Battleford, at what is known as the Second Crossing. It will consist of eleven spans, and the total length of the steel superstructure will be approximately 1,870 feet, not including the length of the approaches. The total weight of steel entering into the structure of this bridge will be approximately 3,500,000 pounds.

The B. F. Sturtevant Co. is fitting up in its big plant at Hyde Park, Mass., rooms that will be used as an emergency hospital, in case of accident to employees. It is to be equipped with all the appliances known to medical and surgical science for the proper care of the men who may get injured in the discharge of their duties until they can be removed to their homes. A graduate nurse and medical student will be in charge, and a local doctor will attend to all surgical cases.

The Simplex Railway Appliance Company has purchased forty acres of land at Montreal West, and fronting on the Grand Trunk Railway, and will erect a plant employing 1,000 men. The company will make railway cars, steel springs, etc. The Canada Car Co., in which President Hoffstat, of the Pressed Steel Car Co., and W. T. Coleman, formerly second vice-president of the American Car and Foundry Co., are interested, will also build works in the suburbs of Montreal.

The Canadian divisions of the International Brotherhood of Locomotive Engineers met in convention in Montreal on August 10th. Secret sessions were held during the day, and in the evening a public meeting was held, which was addressed by Hon. H. R. Emmerson, Minister of Railways, and by several others. The following two days were spent in examining the C.P.R. and G.T.R. shops and in trips to Lachine and to Quebec. About seven hundred delegates were present.

The various industries of the Lake Superior Co. at the "Soo" are getting into operation. After a suspension of nearly two years, construction has been resumed on the Algoma Central and Hudson Bay Railway. Both the blast furnaces, as well as the steel plant of the Algoma Steel Co., are to be in operation this month; and the mechanical pulp mill is making 100 tons of pulp per day. The chemical pulp mill will also be put into operation later on. The charcoal, wood alcohol plants, and acetate of lime plants are now running, their output, being disposed of in advance.

The new Dominion bounty on crude oil has stimulated developments in the oil industry in the Maritime Provinces. An oil field near Memramcook Station, in New Brunswick, is turning out oil in larger quantities and of better quality than the product of the Ontario wells. Thirty-four wells belonging to one company are now producing, and eleven more will shortly be flowing. Natural gas is being found in paying quantities. Dr. H. M. Ami, of the Dominion Geological Survey, recently investigated the oil wells in the neighborhood of Moncton, and is very favorably impressed with what he saw.

Among the machinery exhibits at the Winnipeg Exhibition a prominent one was that of the North-West Machinery Co., of Winnipeg, of which Hon. R. P. Roblin is president, Hon. Hugh John Macdonald, vice-president, and C. Vermilyea, manager. The company deals in blacksmiths' and woodworkers' tools and supplies, and in general machinery, and does a trade as far west as British Columbia. The business has expanded greatly since it was taken over from the firm of Vermilyea Bros. & Merrill, in fact, this very expansion is a source of present difficulty, for to handle properly the trade that is offered more capital is needed. Here would seem to be a good opening for a small investment by manufacturers and others who wish to extend their trade west, through an enterprising firm such as this. The company makes an announcement of the subject elsewhere.

MARINE NEWS.

The Dominion Government has voted \$28,000 to build a new breakwater and improve Toronto harbor.

The SS. Lunenburg, ashore near Sydney, N.S., which, it was expected, would be abandoned, is being repaired at Pictou.

The Dominion Coal Co. has in contemplation the building of steel steamers capable of carrying 1,500,000 to 2,000,000 tons of coal.

The steamer Haddington, recently completed at the yard of the Bertram Engine Works Co., will be managed by J. T. Mathews, Toronto.

The Knapp roller boat is being towed to Toronto, where it will be remodelled into a coal-carrying boat of the ordinary type. It will ply between Toronto and Lake Erie ports.

During July, 5,609,079 tons of freight passed through the Soo canals, establishing a new record. Of the total, 4,817,203 tons passed through the American canal and 719,786 through the Canadian.

The steamer Vega, of Nova Scotia, will be cradled at Anderson's Point, to undergo extensive repairs. Tuck Bros., of North Sydney, have secured the contract for this work.

The car ferry, International, belonging to the Canadian Pacific Car and Passenger Transfer Co., will be rebuilt at the Ogdensburg Marine Railway. The work will require three months.

The Carib II., three-masted schooner built at Shelburne, N.S., in 1901, has made the phenomenal passage of 12 days from Porto Gortez, Honduras, to New York, a distance of 2,100 miles, at the rate of 175 knots a day.

Improvements are being made on Quebec harbor, by the extension of the breakwater by over 900 feet. A suggestion is being made that an additional 500 feet should be also completed at this time, which, if done, will make the extension about 1,500 feet in length.

The British Government Committee on Naval Boilers has issued its final report, after nearly four years of experiments. It declares unanimously that the water-tube boilers are more suitable for the navy than the cylindrical, and selects the Babcock and Wilcox and Yarrow types for naval use.

The Augustus B. Wolvin, the largest freighter on the Great Lakes, recently established an unloading record at Conneaut, where she discharged 7,257 tons of ore in four hours and thirty minutes. She has also carried a record-breaking cargo of 10,769 tons of anthracite.

A libel for \$14,542.20 has been filed against the Canadian passenger and package freight steamer United Empire, at Grand Rapids, by the Calbick Transportation Co., of Chicago. The libelants allege that their schooner, Herald, sustained damages in a collision with the United Empire, October 10th last.

The Dominion Government has made an agreement with the Submarine Signal Co., of Boston, for the installation of thirty bells in the St. Lawrence and off the coast of the Maritime Provinces, 26 stations to be operated from shore, and four from lightships. Arrangements are being made for the placing of telephone receiving apparatus on ships making Canadian ports. The wires on the ships will pick up sounds from bells at distances ranging from four to ten miles, and it is said that there is no difficulty in determining the directions of the sounds.

There was recently turned out from the Bertram shipyard, Toronto, a new ferry steamer, the Tom Fawcett, of rather a peculiar build. She is 133 ft. long by 33 ft. wide, the great width in proportion to her length being on account of the service in which she is to be employed, which requires ample deck room for cattle, horses and farmers going to market. She is an iron-frame boat with 3-in. oak planking. Her engines are of the compound type, 13 by 26 by 36, with Scotch return tubular boiler 8 ft. in diameter by 9 ft. long. She has feathering paddle wheels. She was built to the order of the Wolfe Island Township Council, and will run as a ferry between Wolfe Island and Kingston. The Bertram Company is now building an iron ferry steamer for St. John, N.B., which will be shipped in sections.

The cruiser Canada built by Vickers, Sons & Maxim for the Dominion fisheries protection service, has sailed for Canada.

The Maritime Board of Trade has passed a resolution petitioning the Government for an ice-breaker to keep Sydney an open port all year.

James Hadden, the "Port Hope Baby," one of the best known sailing masters on Lake Ontario, is dead. Deceased was in his 65th year, and lived with his daughters at Port Hope.

The Black Diamond Line steamer, Bonavista, while lying at anchor at Port St. Francis was struck by the Government tug Eureka, receiving severe damage on her starboard bow, just above the water line.

The hull of the Islander, recently located off Queen Charlotte Islands, will be raised by means of large scows, to which she will be attached at low water, the whole being buoyed by the tide. By repeating the process it is hoped that the hull can be towed to a beach about three miles from where she now lies.

The Dominion Government will improve the harbor at Sturgeon Falls, so as to make the mouth of the Sturgeon river easy of navigation. A dredge with a capacity of 1,000 yards per day, and a tug are to be built at Sturgeon Falls, and will be kept for service on Lake Nipissing.

The Black Diamond SS. Catalone, for Montreal, left the channel, near Maisonneuve, on August 21st, and went aground on the mud. After being lightened considerably, she was pulled off undamaged. The cause of the accident is thought to have been a break in the steering gear. The Catalone is under charter to the Dominion Coal Co., and is one of the largest and speediest of the company's fleet.



WINNIPEG.

(Correspondence of Canadian Engineer.)

Winnipeg has of late often been called the Chicago of Canada. It is, or will be, more to Canada than Chicago is to the United States. Chicago has had to divide its trade and manufactures with other cities of the Western and Central States, but Winnipeg is at present the sole entrepot for the commerce of the vast western Canadian plains, which are now being peopled with a rapidity that is remarkable when compared with any period of our past history. Winnipeg has only to keep its reason and self-control, and avoid being led away by real estate boomsters in order to become a great city. The prediction is confidently made by some of its recent visitors that in ten years from now its population will equal that of the Toronto of to-day. This opinion will not be shared by many who remember the Winnipeg estate boom of 1881-2 and its collapse, and who have no personal knowledge of what has happened in the meantime. But even should the boomsters get control of Winnipeg now the situation will still be different to that of 1881. In 1871, when Manitoba was erected into a Province and the reign of the Hudson's Bay Co. ceased, Winnipeg (the Lower Fort Garry, so named after Nicholas Garry, one of the directors of the old company) had a population of 240 souls. By 1881 a railway had entered the town from the States, and the talk of the advent of the Canadian Pacific Railway, with its line to the Pacific coast, brought a tide of eager speculators along with some settlers from the States, and at one time there was said to be 40,000 people in and about Winnipeg. But the C.P.R. was not completed till four years later, and trade across the customs barrier of the States to the south did not develop. It was like the seed which, planted in thin soil, sprang up, but had not depth enough to take root. It was not based upon sufficient settlement, and markets for the produce of the farm, and so it withered, and by the time the transcontinental did reach it the spirit of Winnipeg was broken, and settlement of the country to the west of it developed but slowly. It seemed that the day of destiny had not arrived. The Western States had not yet been filled up, and plagues

of grasshoppers and early frosts combined with prejudiced reports regarding the climate kept the country back.

But since those days a marvellous change has come over the Canadian West. Cultivation of the land has steadily reduced the risks of injurious frosts, the plague of grasshoppers proved to be a very exceptional and not a common misfortune, and it is now realized abroad that the climate of Manitoba and the whole North-West is at least as tolerable, and certainly quite as healthful as that of eastern Canada; and in the course of my journey I met not a few who stated that they preferred the winter of Manitoba to that of the lake regions of Ontario. The wonderfully rich soil of the country and its heavy yields of grain have made thousands prosperous beyond their first expectations, and to-day the vast plains are being peopled with settlers who have complete confidence in its future, and who know that a failure of harvest now and then will not affect their ultimate success. Railway building has gone on with the extension of farming, and often ahead of it, till now the map of Manitoba is crossed with lines like the old settled Provinces of the east. Two great transcontinental systems besides the C.P.R. are working west through the Province, and the trunk lines of the northern States of the American Union are keenly seeking a slice of the growing traffic. The fact that these all converge upon Winnipeg would make this city a great centre of trade, but its re-awakening is based rather upon the growth of the provincial and territorial towns to the west of it, and the growth of these in turn is based upon the actual wealth produced by the farmers and ranchers in grain and stock-raising. I have no doubt that in course of time the great plain stretching from the eastern borders of Manitoba to the foot-hills of the Rocky Mountains—say, 1,000 miles east and west by 500 to 800 miles north and south—will maintain 100,000,000 people in comfort. It is such conditions and such prospects that are swelling the population and trade of Winnipeg at a very rapid rate. In 1891 the population was 25,639, in 1901 it was 44,778, but at the present time its inhabitants, excluding the floating population, are conservatively estimated from the assessments returns at 67,000. In the last ten years the assessed value of city property increased from \$22,001,330 to \$48,214,950, while the bank clearings have increased from \$50,540,648 in 1894 to \$246,108,606 in 1903. The Winnipeg Board of Trade reports the wheat exports to have increased from 15,000,000 bushels in 1894 to 50,000,000 in 1903, so that, taking this staple as an index of business, the growth of Winnipeg has not out-paced but rather lagged behind the growth of the agricultural interests, upon which the city's trade is based.

The city of Winnipeg is now an anthill of transformation and reconstruction. Everywhere in the central portions of the city old warehouses are giving place to newer and greater ones, banks and insurance companies are reorganizing their business and putting up more solid and expensive headquarters, and the era of the sky-scraper has begun. The Canadian Pacific Railway Co., with unabated faith in the country with which its own vast growth is so intimately bound up, is building a great terminus with an eight-story hotel, 236 feet long, and having 315 guest chambers. These will cost about \$1,500,000, and will include a subway for city traffic along Main Street, which the railway will cross. This subway will cost between \$80,000 and \$100,000, is 100 feet wide, having two arches for sidewalks and street traffic and one arch for the street railway. Eight railway tracks will cross this subway. The company has also purchased land in the western part of the city, where it is building railway shops, roundhouses and freight sheds. The sheds will be 1,800 feet long, the roundhouse will contain forty locomotive stalls, and the shops and yards eighty-four miles of track. The shops will be extensive, and will be used for building both passenger and freight cars as well as for repairs. The Canadian Northern Railway and the Grand Trunk Pacific also have plans for extensive terminals and works, though these plans may be modified if the railway commission's recommendation for a Union Station is carried out. It is expected that the new subway will be finished in October, and the new C.P.R. station ready

for occupation about February next. The Winnipeg Street Railway Co. is also building a subway in Portage Avenue, and has started work on new car and repair shops, having a main building 250 x 100 feet, with boiler and engine-room and heating plant, to be finished by October, 1905. These are a few of the semi-public features of an industrial development that has now begun. As to the progress of building in residential quarters, I may cite an instance that came under my own knowledge. The hotels being overcrowded during the Exhibition, I obtained lodgings in Langside Street. In the portion of this street running south from Notre Dame there were over 700 numbers on the houses, and yet the oldest house in the street was less than two years old. My hosts informed me that last year they sat at their back door in the summer evenings and watched the boys playing baseball in the field adjoining, but now there is no adjoining field, for it is all laid out in streets and partially built up. It is at once evidence of the almost reckless progress of building and of the tolerable character of the winters here to add that many of the houses going up are of a frailty that would seldom be found in eastern cities. The excuse for this is that the high rents and great demand for houses force even poor people to buy and build on the instalment plan in order to have a house at all. The building permits taken out in Winnipeg for the first six months of 1904 made a total of over \$6,000,000. Astonishing as it may seem, none of the big cities of the United States reached this record in building this year, and only one exceeded it—the city of New York. It is worth while to notice, by the way, that alert Yankees are taking a more prominent hand in investment in Winnipeg—and even in investments in farm lands in some districts to the west—than eastern Canadians. One cannot be surprised at this, for where the remembrance of the boom of 1881-2 lingers in the minds of the many Ontario and Quebec people who invested to their loss there is apt to be severe skepticism about the reality of rising values in the same field. I had the same prejudice, but, having seen the city and its recent Exhibition, that prejudice is gone, and hence I would advise eastern Canadians to come and see for themselves, and then judge what the development of this western country will mean a few years hence to them as manufacturers, capitalists and colonists.

The Winnipeg Exhibition, this year called the Dominion Exhibition, was a revelation of the potentialities of the West. The show of horses, cattle, and sheep has never been excelled, if equalled, on the continent, while the array of agricultural machinery, covering in all a space of ten acres or more, was a striking exhibit of the revolution in mechanics as applied to agriculture. The manufacturers of the East are evidently waking up to the march of events here, as they had four buildings nearly filled with machinery and goods "made in Canada," these being shown under the auspices of the Canadian Manufacturers' Association, under the supervision of C. B. McNaught, of Toronto, whose services were recognized by the presentation of a purse of \$300 in gold, along with a shower of compliments. Mr. Heubach and his active staff, who managed the show, have proved able exhibition men, and have rendered a service to the whole Dominion in presenting to the East a spectacle of what the Canadian West is capable of.

In a succeeding issue I hope to deal with other developments in the West.

MINING MATTERS.

A ten-stamp mill will be erected at the Redeemer mine, near Dryden. Water power will be used.

It is expected that the Ontario Government Railway will reach New Liskeard about the 1st of September.

The Tye Copper Co., of British Columbia, recently declared a dividend of 10 per cent. for the year. The main shaft is now down 483 feet, and favorable changes in the rock are being met.

A seam containing a large supply of coal of good quality has been discovered at Whales' Head, Belle Isle Straits, Nfld.

It is reported that a 400-lb. nugget of silver was found at Cobalt a few days ago, and that a very rich vein of silver has been struck in another mine there.

The equipment of the overhead conveyors at Talcville, Nfld., is progressing, and it is expected that operations in the talc mines will begin in September.

The Granby Consolidated Co. will spend \$75,000 in building ore bins and putting in two new crushers. Extensions to the smelter will probably not be made this year.

The Privy Council has allowed the appeal of the Calgary and Edmonton Railway, claiming that minerals go with the land in a Crown grant. The company thus becomes possessed of all minerals on its lands except gold and silver.

It is reported from Wabigoon that B. J. Morningstar and G. Palmer, examining the McRae property on Minnehaha Lake, have made a remarkable gold find. The principals are the Minnehaha Mining and Milling Co. It is said that the property will be developed immediately.

Plans for a corundum mill of one hundred tons' daily capacity, to be situated at Palmer Rapids, Renfrew County, have been accepted by the Corundum Refiners, Limited, in Toronto, last week. The construction of the mill will be begun at once, and it is expected to be in operation next summer.

Some fine samples of ore were brought into Rat Portage recently from the Sultana mine on the Lake of the Woods. The ore was mined from the 400 feet level and showed unmistakable signs of visible gold. Forty-five men are now engaged on the property, and 20 stamps have been in operation during the summer.

Since 1896, nearly \$97,000,000 worth of gold has been shipped out of the Yukon, according to the annual report of the Dominion Geological Department, which has just been issued. The production in 1903 was \$12,250,000; in 1900 it was over \$22,000,000. The decline is due to the exhaustion of the best deposits, from which practically all this gold has been secured.

E. J. Davis, Ontario Commissioner of Crown Lands, replying to a letter from labor bodies of Guelph and Toronto, stated that the indications are that there are coal deposits in Northern Ontario, but there are doubts as to whether it will be anthracite of the best quality. Until the railway system is extended, it would be difficult to develop such deposits, but if valuable discoveries are made, such regulations will be provided as will protect public interests from monopoly.

On August 2nd six men lost their lives at Shakespeare Mine, Webbwood, Ont. A blast was fired at six p.m. of the previous evening, and the air was not blown into the mine as usual. At seven in the morning the miners descended, and one after another were overcome and dropped dead off the ladder without the opportunity of warning those following. The dead are: N. MacMillan, mine manager; Peter Reid, mine engineer; John Walters, John Disby, Peter Grant, and Edward Latour, miners. The inquest showed that the accident was due to carelessness. Carbon monoxide was the fatal gas.

J. Walter Wells, mining engineer, Toronto, has been investigating for the Geological Survey the lime, clay and shale deposits of Manitoba in the interests of the cement industry. At present there is only one cement factory in Manitoba, but if new marl deposits are found, other works will be put up in view of the large building operations now going on in the Province.

St. John's, Newfoundland, Herald: Parties who were placing great faith in the gold discovered in White Bay are fast losing hope that it will ever develop sufficiently to pay one-quarter the cost to date. At one place, where a sum said to be in the vicinity of \$40,000 has been expended, so little was received in return that work will close down. Another claim has been completely abandoned, while those who have sent prospectors over the ground have failed to get a report of sufficient material to warrant expenditure of any more money. This is a serious drawback, where so much was expected.

It is said that at the York Harbor copper mine, Newfoundland, the largest seam ever discovered on the island is now being opened up.

A party of eminent United States and Canadian geologists has been visiting Michigan, Wisconsin, Minnesota and New Ontario with the object of preparing jointly a new geological map of those districts. The party visited the Rainy Lake and Lake of the Woods districts of Ontario, last month. Dr. Robert Bell, director of the geological survey, Ottawa, was in charge, the other members of the commission being Dr. Adams, of McGill University, Montreal; Prof. Miller, of Kingston School of Mining; Prof. C. W. Hayes, head of the United States Geological survey; Prof. C. R. Van Hise, president of the University of Wisconsin; Prof. C. K. Leith, of the United States geological survey; Prof. A. C. Lane, state geologist of Michigan; Prof. A. E. Seaman, Michigan School of Mines.

Charles Henry Tyrell, of the Geological Survey, Ottawa, has returned from an exploration expedition in the Edmonton district in search of coal deposits and gas. Mr. Tyrell, in passing through Winnipeg, said to a Free Press reporter that there should be plenty of gas, salt, coal and oil in Manitoba and the North-West Territories. Many indications of these resources were discovered in various places, and it is likely that Ottawa capital will be subscribed to develop it. "Up to now the surface only has been tapped, but where conditions similar to those which prevail in the North-West are found there are usually things below the ground. In Russia the table lands produce oil and gas, and there is reason to believe that these prairies are undermined with a strong flow of petroleum. I found large chunks of 'brearer' near Reaburn, and also in the Edmonton district. These samples I have with me, and from what I can discover I am led to believe that the Pennsylvania wells are only the eastern extremity of an immense vein which extends from the far north-west, passing just north of Edmonton in a wavy line, almost touching Winnipeg, and going east into the States in the vicinity of Kingston or Ogdensburg, which are on the western extremity of a new limestone formation. From Winnipeg the line of oil deposit must run south and dodge the Huronian rocks which extend through western Ontario."

T. W. Gibson, director of the Ontario Bureau of Mines, has returned from a visit to the nickel region of Ontario. He reports that the Canadian Copper Co. is completing its new plant at Copper Cliff. The company draws most of its ore from the Creighton mine, five or six miles distant. This mine, which has the largest and richest body of nickel ore in the world, is being worked as an open cut. The opening is about 250 by 300 feet in area and 60 feet deep, practically all ore. About 80 ft. below this a second level has been opened, which has been broken through to the floor of the first level, the intention being to stope out all of the area between. It is also proposed to open another smaller pit about 500 feet distant on the ore body. There are between 250 and 300 roast heaps of ore burning in the Copper Cliff roast yards. The Mond Nickel Company is operating the North Star mine and conveying the ore to Victoria mine. The Bessemerizing part of the Mond Company's plant is being used to treat the Canadian Copper Company's matte, pending the installation of converters in the latter company's works. Mr. Gibson, in an interview to the Globe, states that he visited the Massey Station copper mine, where some five levels have been run, a large quantity of moderate grade ore being found. The Hermina copper mine, where the shaft is down 140 feet, is being sunk on a rich but somewhat narrow vein of copper ore. At the Shakespeare gold mine, near Webbwood, work is being vigorously pushed. The ore pans gold readily, even where there is no visible gold. The development of water power is making considerable advance in New Ontario. At Webbwood, on the Spanish river, the pulp company is arranging to utilize several thousand horse-power. At the High Falls on the Spanish river also the development of power is rapidly progressing. At Wahnapiatae, the Canadian Copper Company has almost completed an extensive power plant, and at Vermillion considerable power is to be utilized for lighting Sudbury and for the supply of power to that town.

The Cordova gold mine, near Marmora, Ont., belonging to the Cordova Exploration Co., is being pumped out, and operations will be resumed in a short time. The mine has been idle for some months.

Twenty thousand dollars were shovelled in by two miners at No. 10 Eldorado Creek, Yukon, on August 7th and 8th. The clean up was a big surprise, as the claim has been worked continuously since 1897.

The Cape Breton Coal and Iron Company has sold its property at Caherone's Lake to an English corporation, which will at once proceed to operate them. Louisburg will be the new company's shipping point.

A coal property at Boularderie Centre, N.S., is being developed. The coal is much harder than that at Sydney Mines, and appears to be free from shale. A. J. Nicholson, of Barasois, has several men steadily employed on the property.

Shipments of coal from North Sydney have decreased this summer. This is said to be due to the delay in clearing the wharves at Montreal, local coal dealers allowing their supplies to remain at the dock. A rush of shipments is anticipated about the end of the St. Lawrence season.

The Federal Government will shortly be petitioned by the Yukon miners to assume the solution for them of the water problem. If water can be brought in sufficient quantity and at a fair price from the hills, thirty miles distant, it is held hydraulic mining in the Klondyke district will yield fortunes for another half century.

Iron ore from areas at St. George's Channel, N.S., have been assayed and found to contain 60 per cent. hematite. Joseph Frye, of Boston, is now proving the property, which will be purchased by the Dominion Iron and Steel Co., as soon as it is proved to contain a sufficient quantity to warrant its being operated. The deposit is situated at tide water.

Supt. T. J. Brown and Manager Robert Robson, of the Nova Scotia Steel and Coal Co., have located the outcrop of the main seam of coal at Point Aconi. The discovery assures a supply of coal for years to come. It is probable that the mine will soon be opened in the Point Aconi district. The outcrop was found three miles from the place where experts had calculated that it should appear.

Several parties are prospecting for hematite iron ore in the neighborhood of Loon Lake, Thunder Bay district. Indications of this ore, which is in the same formation as the Messaba Ranges, were noticed several years ago. Of several shafts sunk, the deepest is about 30 feet. In the same district, the "Sunbeam," or "No. 282" gold mine, which was worked several years ago, has been reopened this summer with 10 stamps running.

Just before the Boer War, an important discovery of tin was made on the borders of the Transvaal, but during hostilities no efforts could be made to properly test the ore, but a report has now been sent to "South African Mines," giving an analysis of the ore, which shows that it will be amenable to the ordinary methods of tin dressing, and that it is comparatively free from iron compounds. If the Transvaal is found to be rich in tin as well as in gold, coal and diamonds, it will be a land of mineral wonders.



INSTITUTION OF CIVIL ENGINEERS.

As announced in our July number, about two hundred members of the Institution of Civil Engineers of Great Britain will visit Canada and the United States this month. According to the circular issued by the secretary of the Institution of Civil Engineers to members respecting the arrangements, the party will leave Liverpool on the Cunarder Etruria, September 3rd, reaching New York about the 10th. A formal reception will be given by the American Society of Civil Engineers at their rooms, New York, after which the visitors will inspect the Rapid Transit Subway. Excursions to various points will take place, and a dinner will be given by the American Society on the 16th. A special train will leave New York on Monday, September 19th, and will travel over the New York Central to Montreal, where a week will be spent

visiting, under the guidance of the Canadian Society of Civil Engineers, some of the principal objects of interest in the east of Canada, and the week will be very fully occupied. On Tuesday, September 20th, the Canadian Pacific workshops will be inspected. On Wednesday, September 21st, the Soulages canal will be visited by steamboat, the return to Montreal being made by way of the Lachine rapids. In the evening there will be a reception at the McGill University. On Thursday, September 22nd, a visit will be paid to Ottawa. During the night the party will travel to Quebec. On Friday, September 23rd, the time will be spent at Quebec, and inspection will be made of the Chaudiere power development, and of the bridge in course of construction over the St. Lawrence. On Saturday, September 24th, the party will travel from Quebec to Toronto. Sunday and Monday, September 25th and 26th, will be spent at Toronto, and on Tuesday, September 27th, a visit will be paid to Niagara Falls, where the power development and allied industries on both the Canadian and United States sides will be inspected. In the afternoon the party will travel to Chicago by way of Port Huron or Detroit.

After the tour through Canada, which terminates at Niagara Falls, September 27th, the engineers will proceed to Chicago, reaching that city the day following. The same day, together with the following one, will be given to the inspection of objects of interest there. On Friday, September 30th, the party will travel by special train over the Wabash Railroad to St. Louis. No general programme has been proposed for the period to be spent in this city, but visitors are cordially invited to attend the International Congress, which will be held there from October 3rd to 8th, under the direction of the American Society of Civil Engineers.



SEPTEMBER CONVENTIONS.

The fourth annual convention of the Union of Canadian Municipalities will be held in London, Ont., September 20th, 21st and 22nd. Among the special papers to be presented will be: "Special Civic Charters in Canada," by S. Morley Wickett, Ph.D., Toronto; "Park Possibilities in Canadian Cities and Towns," by F. G. Todd, landscape architect, Montreal. Other topics to be discussed are insurance rates, water supply, municipal ownership of public utilities, level crossings and good roads, drainage and sewage problems, etc.

The Structural Iron Workers will meet in convention in Toronto on September 26th, and continuing for about a week. This convention will open the new Labor Temple on Church Street. About 225 delegates are expected.

The Master Steam Boiler Makers' Association will meet in annual convention in St. Louis, September 6th, 7th, 8th and 9th.

The National Electrical Contractors' Association of the United States will hold their annual convention at St. Louis, September 14th, 15th and 16th.

An International Electrical Congress will be held in St. Louis, September 12th to 17th. More than 160 special papers will be presented. Dr. A. E. Kennelly, Harvard University, Cambridge, Mass., is the general secretary.

The Canadian Manufacturers' Association meets in Montreal, September 20th, 21st, and 22nd.



GRAND TRUNK PACIFIC ORGANIZATION.

The Grand Trunk Pacific Railway was organized on August 10th at the first meeting of the shareholders and directors at the general offices of the Grand Trunk in Montreal. Mr. C. M. Hays, general manager of the G.T.R., was elected president, and Mr. Frank W. Morse, third vice-president of the G.T.R., first vice-president and general manager. The other officers are: Mr. William Wainwright, second vice-president; Mr. Henry Phillips, secretary; Mr. Frank Scott, treasurer, and Mr. H. W. Walker, general

auditor. These are also officials of the G.T.R., Mr. Wainwright being comptroller, Mr. Phillips secretary to Mr. Hays, Mr. Scott treasurer, and Mr. Walker general auditor. Members of the Executive Committee are: Messrs. C. M. Hays, Hon. George A. Cox, F. W. Morse, and W. Wainwright.

Following are the directors who were named: C. M. Hays, F. W. Morse, W. Wainwright, W. Y. Biggar, Hugh A. Allan, and E. B. Greenshields, of Montreal; Sir Charles Rivers-Wilson, Lord Welby, Col. Fred Firebrace, Alfred W. Smithers, and John Alan Clutton-Brock, of London, England; Hon. George A. Cox and E. R. Wood, of Toronto; John R. Booth, of Ottawa, and John Bell, of Belleville.

On August 14th the officers and directors left on a trip to the West. A short time was spent at Fort William and Port Arthur inspecting sites for a terminal, Bare Point being urged as a suitable site by Port Arthur residents. The party will be joined by Hon. Mr. Prefontaine, Minister of Marine and Fisheries, in the examination of sites on the Pacific coast. There are three points proposed, Port Simpson, Kitimat, and a third harbor also south of Port Simpson.

On August 18th the personnel of the Transcontinental Railway Construction Commission was announced by the Government as follows: F. B. Wade, K.C., Annapolis, N.S., chairman; Alfred Brunet, Montreal; Robert Reid, London; C. A. Young, Winnipeg. It is reported that P. E. Ryan, secretary to the Temiskaming Railway Commission, has been appointed to act in a similar capacity to the present commission. H. D. Lumsden, of Toronto, is the chief engineer, and Premier Parent, of Quebec, the Government representative on the Grand Trunk Pacific directorate.

The chairman of the Commission, Mr. Wade, will receive \$8,000 per annum, and each of the other commissioners \$7,000. The stipend of the chief engineer will be \$6,000.

Mr. Parent, as Government representative on the directorate, is with the company's party travelling in the West.

The first annual meeting of the company is called for September 20th, in Montreal. The report on terminals will probably be presented at that meeting.

With regard to construction, Hon. Mr. Prefontaine recently made the following announcement in Vancouver: "The surveys have been almost completed, and it is the intention of the authorities of the Grand Trunk Pacific Railway to begin construction at both ends of the line from Winnipeg west and from the Pacific coast towards Winnipeg, and it is the intention of the Government, who have control of the construction from Winnipeg to Moncton, to begin construction from Winnipeg east and from Moncton west." It is stated that the presence of J. R. Booth on the directorate has no significance as indicating the absorption of the Canada Atlantic by the new line.



MUNICIPAL WORKS, ETC.

Burk's Falls is installing a waterworks.

A trunk sewer three miles long is being laid in Winnipeg at a cost of \$200,000.

Brighton has defeated a by-law to purchase \$20,000, first mortgage bonds of the Ontario Electric Railway Co.

Work is being pressed on the new waterworks and the electric light station at Moose Jaw, which are to be finished by the end of the year.

It is expected that before October 1st, a by-law will be submitted in Kingston for the expenditure of about \$100,000 for improvements to the lighting plant.

Portage la Prairie, Man., has called for tenders, open till the 7th September, for 40,000 feet of water mains and 36,000 feet of tile sewers. Willis Chipman, Toronto, is chief engineer.

The Cape Breton Electric Co. recently advanced rates in Sydney, and this fact has brought up the question of municipal ownership. The city council is now investigating the legality and cost of establishing a plant.

The first annual report of the Guelph Fire, Water and Light Commission shows a net profit of over \$10,000. A new boiler will be placed in the power station, and an expenditure of \$5,000 in improving the waterworks is proposed.

The St. Thomas city council's offer of \$29,000 for the gas and electric plant has been refused by the Gas Company. The company has appointed an arbitrator to be one of three to fix a price if the city still desires to purchase the plant.

Berlin is building two septic tanks and two storage reservoirs, 150 by 36 feet, and seven feet deep. These, with the existing tank, will give a total capacity of 530,000 gallons. Casper Braun has the contract, his price being \$16,400. The tanks are to be completed by October 1st.

Brandon, Man., is enlarging its waterworks. The present pumping station, having a capacity of 1,500,000 gallons per day, is moved to a higher site, and two new pumps are being installed to increase the capacity to 3,500,000 gallons. Underlying the station is a bed of sand, which will be utilized for filtering the water. Plans are being made for a sewerage system for the city.



LIGHT, HEAT, POWER, ETC.

Ottawa has closed its contract with the Ottawa Electric Co. for street lighting for ten years at \$52 per light per year.

The Beamsville sub-station of the Hamilton Cataract Co. was recently damaged by lightning to the extent of about \$1,000.

The Sydney Mines (C.B.) Lighting Co.'s plant began operation the first week in August. There are at present 110 32 c.p. street lights.

The Canadian Niagara Power Co. has given a \$5,000,000 mortgage to the Toronto Trust Co., covering all the company's property, plants, privileges, etc.

R. T. Swales, temporarily acting as night constable at St. Mary's, was found dead in the basement of the Town Hall, grasping the cord of an electric bulb.

Before the end of September it is expected that an addition of 5,000 horse-power will be delivered by the Hamilton Cataract Light, Power and Traction Co.

The Hamilton Cataract Power, Light and Traction Co. have completed the enlargement of Lake Gibson. The lake now covers seventy acres. St. Catharines will be supplied with water from this reservoir.

St. John, N.B., is thinking of buying the lighting station of the Carleton Electric Co. for \$21,000. The city at present pays \$105 per light to the Carleton Co., whereas the St. John Railway Co.'s lights cost only \$85.

Ottawa has changed its agreement with the Metropolitan Electric Co. so that it has not the right to acquire the property of the company until 1914 instead of 1908. This change was made at the request of the company in order to facilitate financing.

James Tetley, an electrician in the employ of the Toronto Electric Light Company, met his death in the cellar of his house, on August 20th, by an electric shock. An electric light wire at the corner of the street broke and fell across a street railway feed wire. Soon after this something went wrong with the lights in Tetley's house, and he went down cellar to investigate. When found, he was lying dead, clasping a light bulb in his hand. An inquest was considered unnecessary, as there was no evidence of negligence.



PERSONAL.

J. F. H. Wyse, formerly with the Brantford Electrical and Operating Co., is now practising in Toronto, as consulting, electrical and hydraulic engineer. His address is 16 King St. West.

W. S. Edge, divisional engineer of Mr. Schwitzer's office, has been appointed to the vacancy in the engineering department of the C.P.R. caused by the untimely death of W. T. Laing at Killarney, Man.

Alan M. Jones, till recently assistant engineer of the Illinois Central Railway, has been appointed a locating engineer of the Grand Trunk Pacific, and is now in Manitoba.

Bendt Q. Bay, a Danish engineer in the employ of the C.P.R., was killed while engaged in the construction of a bridge at Woodbridge. He fell under the wheels in getting off a train.

Albert H. Kirkpatrick, superintendent of construction for E. Leonard & Sons, London, Ont., was killed by falling into a fly-wheel in Prince Albert, Sask., where he was installing the electric light plant.

No successor has been appointed to Geo. Mountain, till recently chief engineer of the Canada Atlantic Railway. The general superintendent, M. Donaldson, assumes supervision of the track department for the present.

P. W. St. George, C.E., Montreal, has been appointed as engineer on behalf of the Department of Marine and Fisheries during the construction of the new permanent sheds for Montreal harbor at a salary of \$3,000 a year.

John J. McGill, formerly manager of the Canadian Rubber Co., of Montreal, and now president of the Dominion Belting Co., of Hamilton, has been nominated for the presidency of the Montreal branch of the Canadian Manufacturers' Association.

R. C. Carter, of Kingston, general manager of the Bay of Quinte Railway, the Oshawa Railway, the Thousand Islands Railway, and the Deseronto Navigation Company, died at the Royal Victoria Hospital, Montreal. He was 60 years old and had been suffering from a paralytic stroke. Besides his connection with transportation companies, Mr. Carter was a director of the Canadian Portland Cement Company and of the Rathbun Company, of Deseronto.

Alexander K. Kirkpatrick, city engineer of Kingston, has resigned that position to take the appointment of professor of civil engineering in the School of Mining of Queen's University, Kingston. Mr. Kirkpatrick graduated from the Royal Military College in 1882, and for seventeen years was on the engineering staff of the C.P.R., for part of which time he was division engineer in Toronto. In 1899 he went to Egypt as chief engineer of Egyptian railways and the port of Alexandria. For personal reasons he returned to Canada when offered the city engineership of Kingston in 1900. For three sessions he has been lecturer on railway engineering at the School of Mining.

With regard to the communication in last issue respecting a certain appointment to the engineering staff of the Public Works of the North-West Territories, Mr. Wiggins writes that he did not lay claim to the position of Assistant Chief Engineer of Public Works, N.W.T. The report that he had received this appointment was published in several papers in Manitoba and the North-West Territories, and, as Mr. Macintyre says, the returns made to the Canadian Society of Civil Engineers credit Mr. Wiggins with the same post. Mr. Wiggins explains that his position is that of District Surveyor and Engineer of the Public Works Department for the district of Centre Assiniboia.

A. J. deB. Corriveau, of Montreal, was killed by a street car in that city on August 6th. He was running diagonally across the street when struck by a car and thrown to the pavement, fracturing his skull. The coroner's jury finds that the fatality was an accident, no blame attaching to the motorman. Deceased was born at St. Thomas, Quebec, and was 54 years of age. He established the Corriveau Silk Mills in Montreal, 25 years ago. He was later in the employ of the Royal Electric Company and the Montreal Street Railway Company, and it was he who initiated the idea of the Montreal Park and Island Railway. During the past few years he was interested in the automobile business, and was one of the first to introduce the automobile in Montreal. He was interested in canals also, having secured a charter for a canal connecting the St. Lawrence river with the Richelieu. Mr. Corriveau was a very energetic man, and was never known to lose a day through illness. Mr. Corriveau was the projector of the first silk mill in Canada, and suggested and promoted the first electrical convention as well as the first street railway convention in Canada.

Thomas B. Tate died recently in Ogdensburg, N.Y., at ninety years. Mr. Tate ran the first line of railroad through Canada, called the St. Lawrence and Huron road. In 1854 he built the Brighton and Norman line. He also supervised the construction of the Grand Trunk from Toronto to Kingston. He was chief engineer of the railroad from Potsdam to Potsdam Jct., and also the Morristown branch. He made the official map of Ogdensburg, and had surveyed lands in every town in St. Lawrence Co., N.Y. Deceased was born in England, and came to America in 1818. He leaves a son in Ogdensburg and a daughter in Leamington, Ont.

Marcus Smith, M.I.C.E., of Ottawa, died last month in his ninetieth year. Mr. Smith was born near Berwick-on-Tweed, Eng., July 16th, 1815, and studied for his profession there. After several years spent in land surveying and railway work in England and Wales, he moved to America, settling first in the United States. Removing to Canada, he continued in municipal work, making surveys and maps of several cities and towns, including Hamilton, Dundas, St. Catharines, Galt and Brantford. Taking up railway work, Mr. Smith did considerable work on the location of the Sarnia, Hamilton and Toronto branches of the Great Western Railway, now a part of the Grand Trunk system. In the following years he was engaged in railway work in Cape Town and England, returning to Canada in 1868. He was called back to this country to take a position on the staff of Sir Sandford Fleming on the construction work of the Intercolonial Railway. He had charge of a section leading from Bathurst. This position Mr. Smith resigned to accept that of deputy to the engineer in chief of the Canadian Pacific Railway, when he was immediately despatched to take charge of the surveys in British Columbia. Mr. Smith's ability was further recognized when, in 1876-78, he was appointed to act as engineer in chief during the absence in England of Sir Sandford Fleming. He had charge of several important surveys on the line in British Columbia. In 1886 his connection with Canada's great transcontinental railway ceased, but he continued until 1892 in the public service as a consulting engineer. Mr. Smith was elected an associate of the Institute of Civil Engineers of England in 1866.



The Intercolonial will build a \$70,000 station at Sydney, C.B., to be finished by June, 1905.



—The United States has inaugurated a Government wireless telegraph line from Nome to St. Michael's, Alaska, a distance of 107 miles.



—The Pacific Wireless Telegraph Co. is equipping a station at Victoria, B.C., which, it is hoped, will be open for commercial despatches in about a month.



Owing to a disagreement as to the price of water supplied by Stratford, the Grand Trunk is installing its own water supply plant in that city. The plant will cost \$20,000.



The new shops of the G.T.R. at Stratford, Ont., are to cost \$170,000, and to be completed by the end of December, when the staff of hands will be increased by about a thousand men.



The Railway Commission, at its sitting in Winnipeg, declared its policy to be in favor of a Union Station in that city, capable of accommodating not only the two railways at present there, but others likely to reach the city in the future.



A boiler explosion at the Kinleith Paper Co.'s mill, at St. Catharines, wrecked one of the buildings. The boiler was a rotary rag boiler, receiving steam from the main boiler in another building. The cause of the explosion is unknown. The loss is estimated at \$15,000.

NEW INCORPORATIONS.

The British Columbia Gazette announces the incorporation of the following:

The International Roller Bearing Co., with a capital of \$25,000, to manufacture the Kincaid Patent Roller Bearings.

The British Columbia General Contract Co., capital, \$50,000.

The Standard Oil Co., of British Columbia, capital, \$1,000,000.

Northern Gold Mines Co., capital, \$1,500,000.

The North-West Territories Gazette announces the incorporation of the Weyburn Telephone Co.

Consolidated Spruce Creek Placers, Limited, of Seattle, Wash., has been licensed to do business in British Columbia.

The British Columbia Gazette announces the following incorporations:

Flathead Valley Oil Lands Development Co., capital, \$250,000.

British Columbia General Contract Co., capital, \$50,000.

Dundee Gold Mine, Limited, capital, \$25,000.

British Columbia Foundry and Engine Works Co., capital, \$100,000.

Elk River Coal and Oil Co., capital, \$25,000.

Eva Gold Mines, Limited, capital, \$500,000.

Ross & Howard Ironworks Co., capital, \$250,000; to take over the business of Ross & Howard in Vancouver.

Georgia Rock Co., capital, \$10,000.

Green City Mining Co., capital, \$100,000.

The Canada Gazette announces the following:

Canadian Lowe Coke and Gas Co., capital, \$1,000,000; head office, at Montreal. Incorporators: A. W. G. Macalister, W. J. Henderson, W. G. Mitchell, G. E. Clark and G. H. Semple.

St. Lawrence Coal Co., capital, \$500,000; head office at Montreal. Incorporators: C. Brandeis, J. S. Buchan, and W. H. Olive.

Pennsylvania Coal Co., capital, \$20,000; head office at Montreal. Incorporators: Senator Mitchell, L. E. Kimpton, H. L. Mitchell, H. P. Mitchell, and R. T. Heneker.

St. Lawrence Construction Co., capital, \$20,000. Incorporators: J. Ethier, A. Dansereau, A. Secompte, and H. Audette.

Kent Oil Co., capital, \$100,000; head office, at Harcourt, N.B. Incorporators: H. Von Hagen, of New York; M. F. Keith, of Harcourt; W. R. Townsend, of Moncton, and others.

The Consolidated Plate Glass Co. is now empowered to manufacture glass.

The Canada Gazette announces the following incorporations:

The Railway Spring and Supply Co., capital, \$49,000; head office at Montreal. Incorporators: J. Rogers, C. Coughlin, F. D. Shallow, P. M. Wickham, and J. A. Rowan.

The Bonanza Creek Hydraulic Mining Co., incorporated in Great Britain, is authorized to do business in Canada.

The Rainy River Navigation Co. has increased its capital from \$99,000 to \$150,000.

Hillcoat Bearing Co., capital, \$20,000; head office at Amherst, N.S. Incorporators: H. V. Hillcoat, F. L. Blair, A. J. Crease, H. A. Hillcoat, and J. W. Taylor, all of Amherst.

Cie d'Aqueduc et d'Eclairage de Belœil is incorporated at Belœil, Que., with a capital of \$20,000. Incorporators: I. Prefontaine, C. Guertin, J. Malo, and others.

Canada Rolling Stock Co. is incorporated at Toronto with a capital of \$250,000. Incorporators: N. Curry, N. A. Rhodes, Hon. T. R. Black, and others, all of Amherst, N.S.

The Ontario Gazette announces the following:

The Trussed Concrete Steel Co., of Michigan, is licensed to operate in Ontario, A. R. Bartlet, of Windsor, being attorney.

The Godson Contracting Co. is incorporated at Toronto

with a capital of \$100,000, the incorporators being: Margaret Godson, F. W. Godson, A. F. Godson, and others.

Colborne, Ont., has passed a by-law to loan the Ontario Electric Railway \$150,000.



The price of residence telephones in Ottawa has been reduced from \$30 to \$25 by the Bell Telephone Co.



The conclusion of W. L. McFarlane's paper on A. C. vs. D. C. Arc Systems will be published in October issue.



Visitors to the Toronto Exhibition, interested in structural work, may see an example of concrete and steel construction in the new warehouse of A. A. Allan & Co., Bay St., where the Kahn sheared steel bar is being used.



The Grand Trunk Railway, acting for all companies interested, has filed with the City Clerk of Toronto their plan for expropriation of the Esplanade property. The plan provides for the closing of Bay street, Lorne street, York street, from Front to Station street, Station street from Simcoe to York, and Esplanade street from York to Yonge street. The property to be expropriated includes all that west of the Customs House, and east of York Street, south of Front Street.



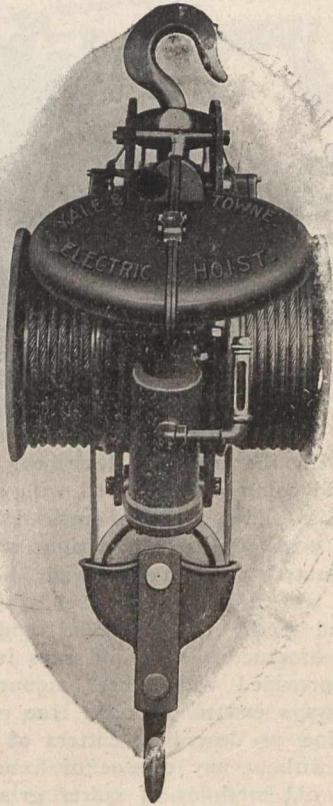
The largest wireless telegraph station in the world is being erected at Pisa, Italy. The station will be called Coltano, and it is designed to establish wireless telegraphic communication from there with Great Britain, Holland, the United States and Canada, as also with vessels in the Mediterranean, the Baltic Sea, the Red Sea and the Atlantic and Indian Oceans. The buildings will be of the most approved style, and will be constructed entirely of stone. As it will take some time to put the machinery and apparatus in place, the station will probably not be ready for receiving and transmitting messages before the beginning of next year. The Marconi system will be employed.



The Stromburg-Carlson Company, of Chicago, through A. B. Smith, has offered the city of Brantford \$200 per year for a competitive franchise, to operate in Brantford, in addition to granting five free phones to civic officials. They promise to instal a central energy system before Christmas with immediate connection for 500 phones and an ultimate capacity of 2,000. All lines and cables will be underground, and the total outlay will be \$35,000, borne entirely by the company. The proposed rates are \$25 for business and \$15 per year for house phones. The city will be allowed to string electric light and fire alarm wires on an arm of the company's poles. Long distance equipment has been arranged for between Brantford and Windsor. A representative of the Ontario Independent Telephone Co., of Detroit and Windsor, now operating in Western Ontario, made an offer on similar terms. The Stark Telephone Light and Power Co., of Toronto, is making four separate propositions to the city as follows: (1) Business phones, \$6 per year and one cent per outgoing call, with a maximum charge of \$25; residence connections, \$6 per year and one cent per call for all calls, or a flat rate of \$12 for unlimited service; electric light, eight cents per 1,000 watt hours. (2) Business phones at \$25; residence phones, \$15. (3) To construct an electric light and telephone plant on the Stark system at cost plus 10 per cent. engineering expenses, the city in addition to pay royalty of 10 per cent. of gross receipts for use of Stark patents. (4) To construct telephone system only at cost, plus 10 per cent. These propositions are now being considered by the council.

THE YALE & TOWNE ELECTRIC HOIST.

This hoist is designed to meet the growing demand for a simple, convenient and durable power hoist. It is made to withstand the roughest usage and give satisfactory service in the hands of the inexperienced workman. It may be moved from one place to another as easily as a chain block, and used in any part of the works or yards where current is available. It greatly increases the efficiency of any hand crane, and its compactness enables it to be hung up and operated in the smallest space. It is described by the manufacturers, the Yale & Towne Mfg.



Co., of New York, as follows: The material throughout its construction is the best obtainable, and all parts are made to gauge, thus securing complete interchangeability. The motor is placed above the oil submerged parts of the hoist and the motor shaft bearings prevent the possibility of oil entering the motor. The improved oiling devices preclude heating from overload, or injury from the high temperatures usually existing near the ceiling. The load is taken on wire hoisting rope of the toughest steel, wound on grooved drums that are keyed direct to the main shaft. At the bottom hook the steel hoisting rope passes around an equalizing sheave, thereby balancing the strain. All parts under tension or subjected to transverse strain are of forged steel or wrought iron. The hoist always balances properly on its single upper hook whether loaded or empty, and pulls in a true vertical line throughout the lift. The single swivel hook suspension allows the hoist to pull as well at any angle. The working parts are enclosed in an oil tight iron casing, which excludes the dust and water, at the same time insuring thorough lubrication. The load cannot run away even should the motor or brake become inoperative; an automatic cut off prevents the load being hoisted too high. The hoist is operated from the floor, and is regularly equipped with a telescoping controller rod enabling the workman to control it from a point in full view of his work without depending on signals to a crane operator. Pendant cords or chains will be furnished if preferred, but the rod-controlling device gives more accurate control of the load and is so made that it cannot catch any obstruction and start the hoist when traversing on a crane or runway.

The company have one of these hoists in operation at their exhibit at the World's Fair, St. Louis, where they have also one each of their triplex, duplex and differential blocks operated by electric motors for the purpose of showing relative efficiency. Each block is supplied with a 1,000-lb. weight and so arranged that equal power is sup-

plied to each block. The result is that the triplex block lifts its load much more quickly than the others, while at the same time the ammeters show equal power applied to each block. The mechanism is automatic, so that when the triplex weight arrives at the top all three blocks reverse their motion and lower the weight until all reach the floor, when they again automatically reverse and begin to hoist. The arrangement shows at a glance the comparative efficiencies of a block and is particularly interesting to any engineer.

BECKER-BRAINARD NO. 1, 14" CUTTER AND REAMER GRINDER.

This machine, which is made by the Becker-Brainard Milling Machine Co., of Hyde Park, Mass., is unlike other cutter grinders in that it requires no extra fixtures for handling any style of milling cutter or reamer. It has two separate knees each provided with its own slides. The cutter to be ground is transferred from one to the other for the different operations on the side and end teeth. Fig. 1 gives a view of the machine as regularly made from which we get a very good idea of the weight and proportion as a whole. Here we see the two different knees mentioned above. On the left-hand side of the machine we have the main knee, which swivels around the supporting column, and carries the head and tail stock for grinding cutters on centres, or with bar inserted in place of the head stock centre, and the tail stock removed. We grind cutters by sliding them on the bar in front of the wheel, which ensures a cutter ground straight and true with the hole. On the right-hand side we have a novel arrangement for grinding the end mills, or the side teeth

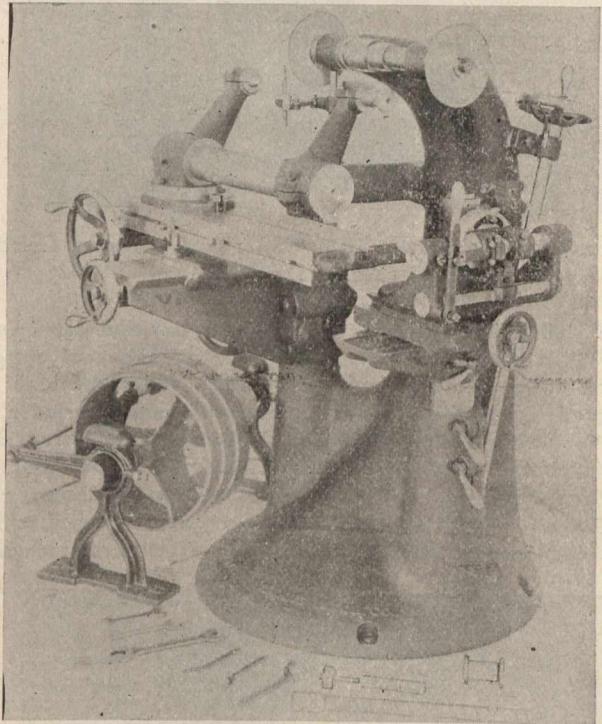


Fig. 1.—No. 1. Fourteen-inch Cutter and Reamer Grinder.

of straddle mills and inserted tooth cutters. This sliding head can be swivelled for grinding bevel or dove-tail mills, and is provided with a plunger finger which is always set on the centre. The object sought for in this arrangement is to do away with many of the devices ordinarily used for this work, and it is also unnecessary to use any other than 7-in emery wheel shown. In Fig. 2 is shown a machine arranged with motor drive and which is on exhibition at Becker-Brainard Milling Machine Co.'s space in Machinery Hall at the Louisiana Purchase Exposition. Figs. 3 and 4 show good illustrations of the improved manner of handling work on the machine, showing as they do, straddle and end mill in both positions. This also shows how the clearance is obtained on the end and side teeth. Other illustrations, which cannot here be given for

lack of space, show a plain milling cutter on the bar and small end mill in the sliding head; a slitting saw on the bar and the sliding head swivelled with a bevel mill in position for grinding; a bevel mill in position for grinding between centres at the left-hand wheel; a large inserted tooth face mill in the sliding head, that is probably the most difficult cutter to handle on any grinder without using special fixtures. The sliding head arrangement on this machine makes this a very simple operation; and a

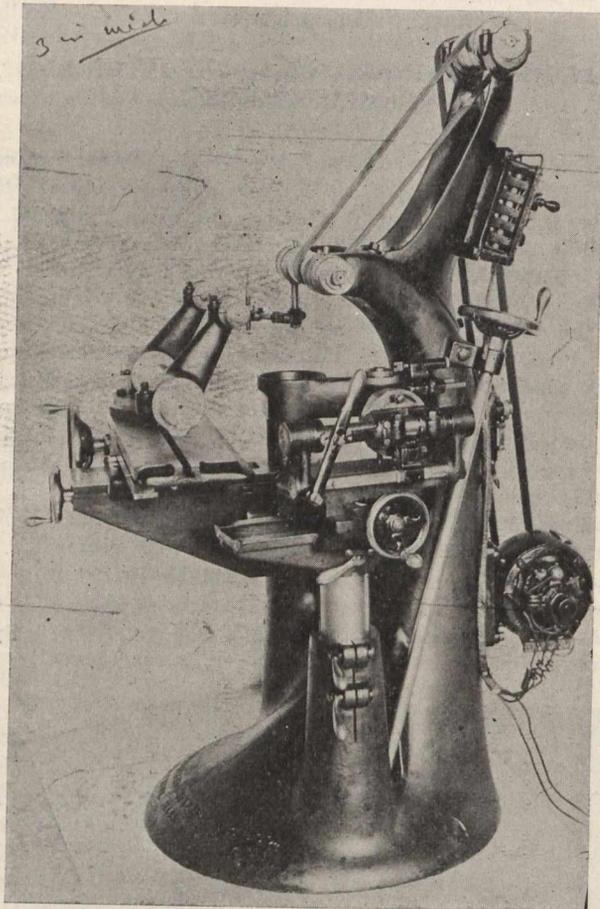


Fig. 2.—No. 1. Fourteen-inch Cutter and Reamer Grinder (Motor Drive).

large slab milling cutter on the bar in position for grinding. This machine has a capacity for all styles of cutters up to 14-in. diameter and 14-in. long. The machine is designed distinctively as a cutter and reamer grinder to fill the need of a machine capable of grinding heavy cutters of large diameter and long face, which are used on the large column and planer-type milling machines, also the large diameter inserted tooth cutters. The machine will take care of all styles and sizes of cutters, including

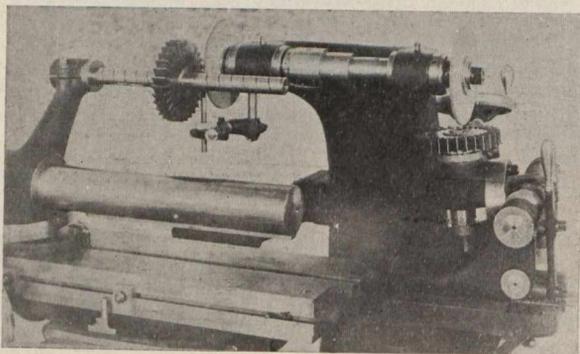


Fig. 3. Grinding Face and Side of Straddle Mills.

plain, straddle, form and end mills, being made especially stiff and heavy to eliminate vibration, which frequently occurs in most of the lighter grinders. The machine is provided with two columns, one of which has a knee, with saddle and table, which has 6-in. of vertical adjustment, and will swivel around the column in either direction. The adjustable vertical column is graduated so that setting

can be instantly made to give the proper angle of clearance of cutter for different diameters of emery wheels used. The table on saddle is fed by rack and pinion, having a longitudinal feed of 20-in. and a cross feed of 7-in., and is provided with graduated swivel head, which carries a bar on which to slide cutters while being ground. Head and tail centres are also provided for holding end mills and reamers which have to be ground on centres. With the cutter grinders usually on the market, it is necessary in order to grind side, face and angular mills, to se

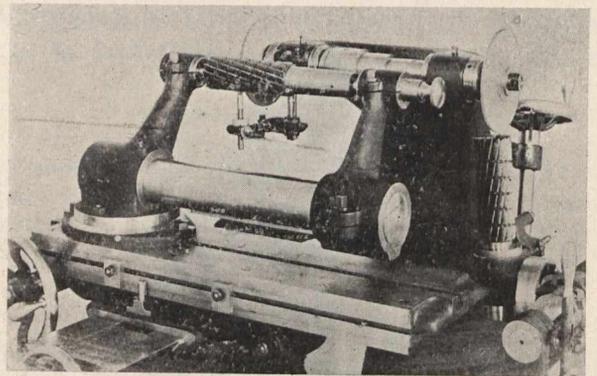


Fig. 4. Grinding Side and End of Taper Shank End and Side Mill.

special fixtures, which consume more or less time in setting, whereas with the machine described, it is unnecessary, as a second column is provided with swivel carriage carrying two cross slides, the top cross slide having 7-in. and lower slide 9-in. adjustment at right angles. On the top slide is mounted a graduated swivel head or holder, which slides on a bar, having a travel of 5-in. used for grinding the end teeth of cutters and end mills. The spindle is made of crucible steel and runs in self-centering bronze boxes, provided with wheel mounts fitted with taper end to always ensure perfectly true running wheels. With the machine, as described, cutters of all description can be ground without any change of fixtures, and much faster than the old methods of cutter grinding.



"MULTI-PATH" LIGHTNING ARRESTER.

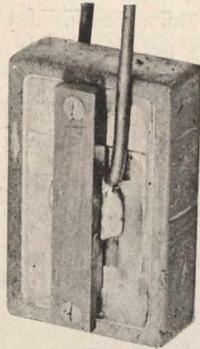
The unusual number of electric storms during the past summer in Canada makes the subject of lightning arresters one of interest. The necessity for the use of arresters for the protection of electrical apparatus is now generally recognized, and practically every plant now installed is provided with a greater or less number of arresters of one kind or another.

In order to understand the use and method of operation of a lightning arrester, it is well to consider the action of lightning or static electricity upon the transmission system. Take the case of a street railway system, where the trolley and feeder wires may be many miles in length. During a thunderstorm, or when the air is heavily charged with static electricity, a highly charged cloud passes over the trolley wire which is several feet above the ground and insulated from it. This highly charged cloud induces a charge of opposite side on the trolley and feed wires. There is, however, no tendency for the charge upon the wire to pass to ground, as it is "bound" or held by the charge in the cloud. If, however, the cloud passes away from the wire, or if the potential is suddenly lowered by a lightning discharge, then the charge on the trolley and feeder wires is no longer held and immediately tries to pass to ground. In order to get to ground, it may jump over a line insulator or pass through the insulation of apparatus connected to the trolley wire, i.e., motors, controllers or generators, or if there are lightning arresters connected to the trolley wire it may pass to earth through these arresters. It is evident, other things being equal, that the charge will pass over the path of least resistance. For this reason, it is necessary that the lightning arresters offer an easier path to earth for the lightning discharge than does the insulation of the appar-

atus to the circuit. If there were no voltage on the circuit other than the static voltage, a discharge, even through the insulation of the apparatus, might produce no serious consequences, but with a generator voltage constantly existing between line and ground, it is evident that a dynamo current may follow the static discharge and thus wreck the apparatus.

There are two essential requirements for an effective lightning arrester: 1. It must offer an easy path for static discharges to pass to earth. 2. It must not permit the line current to follow the static discharge through the arrester to such an extent as to damage the arrester.

To meet either of these requirements alone is a simple problem, for it is obvious that but for the danger of the line current following the static discharge a plain air gap



would be sufficient for making an effective arrester. On the other hand, if a low resistance path to earth was not demanded, the construction of an arrester, across which an arc would never be maintained by the line voltage, would be an easy matter. These two essential requirements are thus in a sense antagonistic, and the best that has been done is to make a compromise between them. Thus the path to earth has not often nearly so low a resistance to static discharges as could be desired, while every year hundreds of arresters are destroyed by their failure to interrupt the line current which follows the static discharge.

Many arresters now on the market use a carbon rod resistance in series with an air gap and an arc rupturing device. The function of the resistance is to limit the current which the line voltage can force through the arrester to a value such that it may be successfully interrupted by magnetic blow-out or other arc rupturing device. Unfortunately, the insertion of this carbon resistance increases the difficulty of a static discharge passing through the arrester. It is also found that on some arresters the resistance of the carbon rod increases enormously after a few discharges, so that current cannot pass through it, but is forced over its circuit. When this happens the speedy destruction of the arrester is certain.

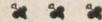
During his extended investigations of static phenomena and the protection of apparatus from lightning discharges, it became evident to P. H. Thomas, of the Westinghouse Electric and Mfg. Co., that to successfully protect apparatus operated on low voltage circuits, such, for example, as railway motors and generators, it would be necessary to produce an arrester which would offer a much easier and more open discharge path to earth than could be found in any arrester previously devised. To protect the arrester from damage, due to the line voltage holding over, was also an essential requirement. Experiments were begun promptly, and have been carried on continuously for several years, both in laboratory and under actual service conditions. The result of these experiments has resulted in the production of an arrester which is said to have a protective power greater than that of any other.

Two general principles underlie the successful operation of the new arrester: 1. There is a minimum voltage, below which an arc cannot be maintained across an air gap, no matter how small that gap may be. 2. Under proper conditions, a static discharge will distribute itself over a great number of parallel paths, so that the amount

passing over any one path will be very small, producing practically no heating or disintegrating effect.

From this second principle the arrester takes its name, Multi-Path (M.P.) The arrester consists essentially of a specially prepared block of carbon, in which the area offered for discharge is very great, as compared to the length of path through which the discharges pass. In this block there are a great number of separate conducting paths, and the discharge passing through the block divides and takes simultaneously many different ones. Each of these paths is broken up by a large number of minute air gaps, so that the voltage across each gap is very small and the line voltage cannot maintain an arc across them. Thus the arrester is non-arcing since the line current does not follow the static discharge. In series with the carbon is a small air gap rigidly maintained between two metal surfaces. This air gap keeps the arrester insulated from the line, except the instant of a discharge. The active parts of the arrester are enclosed in a cast-iron box which is filled with a waterproof compound. The arrester is weatherproof and fireproof. It may be used indoors or outdoors and may be located in practically any position desired. Its weight is from one-third to one-half that of any other arrester on the market, it is small and compact, and has absolutely no moving parts to stick and get out of order.

Some of the advantages claimed for the M.P. arrester are as follows: 1. Great protective power (low resistance to static discharges). 2. Non-arcing. 3. No moving parts. 4. Fireproof construction. 5. Light weight. 6. Neat appearance and ease of installation. 7. Simplicity and compactness.



A NEW PEAT PROCESS.

For ten years experiments have been made in Ontario and elsewhere with a view to converting bog peat into a practical commercial fuel. The usual method has been to compress the peat and set it in the sun to dry. This method has met with more or less success, but it has long been known that a certain amount of latent water remains in the peat. It is contained inside minute pods on the vegetable fibres, and these pods refuse to burst, but merely crowd closer together on the application of pressure. The result, of course, is that the peat has not as good burning qualities as it would if this latent water could be driven off, and besides that, the peat disintegrates after long standing, and the dust formed is waste, good for nothing but for use as a fertilizer.

A gentleman in England, however, who has been experimenting for a number of years, has at last found a method of driving off the latent water. His process is as follows: The peat is put in a perforated cylinder, which is revolved at 600 revolutions per minute, causing the loose water to be thrown off in all directions through the perforations. After the peat is brought to a moderately dry state, an electric current is passed through the peat in the cylinder and it is revolved again. Millions of sparks are thrown off, and also a great deal more water. The peat is then taken out and put through a brick machine, and after a couple of days' drying is ready for use.

The product is called peat-coal, and tests show that it is better than anthracite, giving from 13,000 to 17,000 thermal units, as compared with 8,000 to 11,000 from the best English steam coal. The peat-coal is hard, clean, and without waste. It weighs somewhat heavier than coal. It is produced for 4s. a ton, and it is expected that this cost will be cut down to 2s. 6d. In the electric treatment the peat undergoes some change, which is not yet understood, which renders it practically smokeless. Such an invention as this was not long looking for a market. The Electro Peat-Coal Co. was formed, with Earl Meath as chairman of the board. A capital of £130,000 was asked for, and £160,000 was subscribed. The enterprise is the first successful industrial venture floated on the London market in three years. The company has a plant working on a commercial basis, and will establish plants all over the British Isles. The

German patent has been sold, and arrangements are being made for other European rights.

W. M. Barber, of Toronto, who has been interested in peat for a number of years, learned of the electro process when in England recently, and brought home the rights for America. The Mexican rights are being sold, and a Canadian syndicate has obtained the patent for Canada. An engineer is being sent to England to report on a demonstration, and if this is satisfactory a machine will be sent out immediately. Meantime the syndicate is securing peat beds at Galt and elsewhere. It is believed that the cost of production in Canada should not be more than a dollar per ton at the outside. The syndicate hope to have peat-coal on the market this autumn.



SCOTCH DESIGN OF VARIABLE SPEED LATHE.

We show herewith two illustrations of a new departure in lathe building by John Lang & Sons, Johnstone, Scotland, the special feature of which is the use of a variable speed drive instead of the usual step cone pulley.

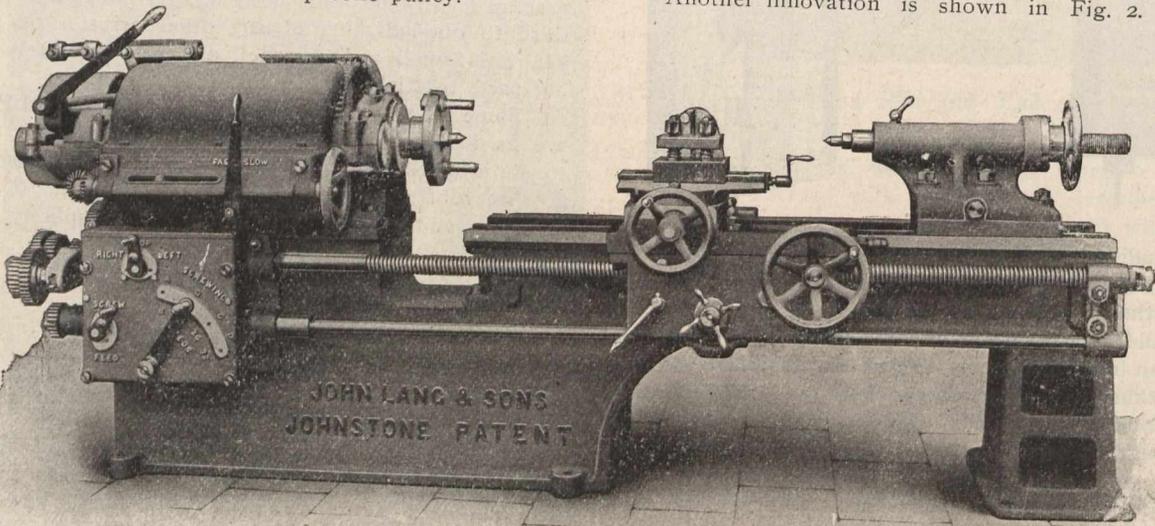


Fig. 1.—Twenty-inch Swing Triple-Geared Lathe.

Fig. 1 shows a 20-inch swing triple-gear lathe, and Fig. 2 shows a view, in plan, of a turret lathe with gear case removed. No counter shaft is necessary with this arrangement, the fast and loose pulleys being placed on the first shaft of the lathe, and are operated by the lever in front as shown on Fig. 2.

covers are fitted over the slide surfaces of the lathe bed. These are bolted to the bed, and pass through cored holes in the slide rest, their object being to protect the surfaces from falling chips and cuttings.

These lathes are made from new designs and patterns throughout, and combine the handiness of the American

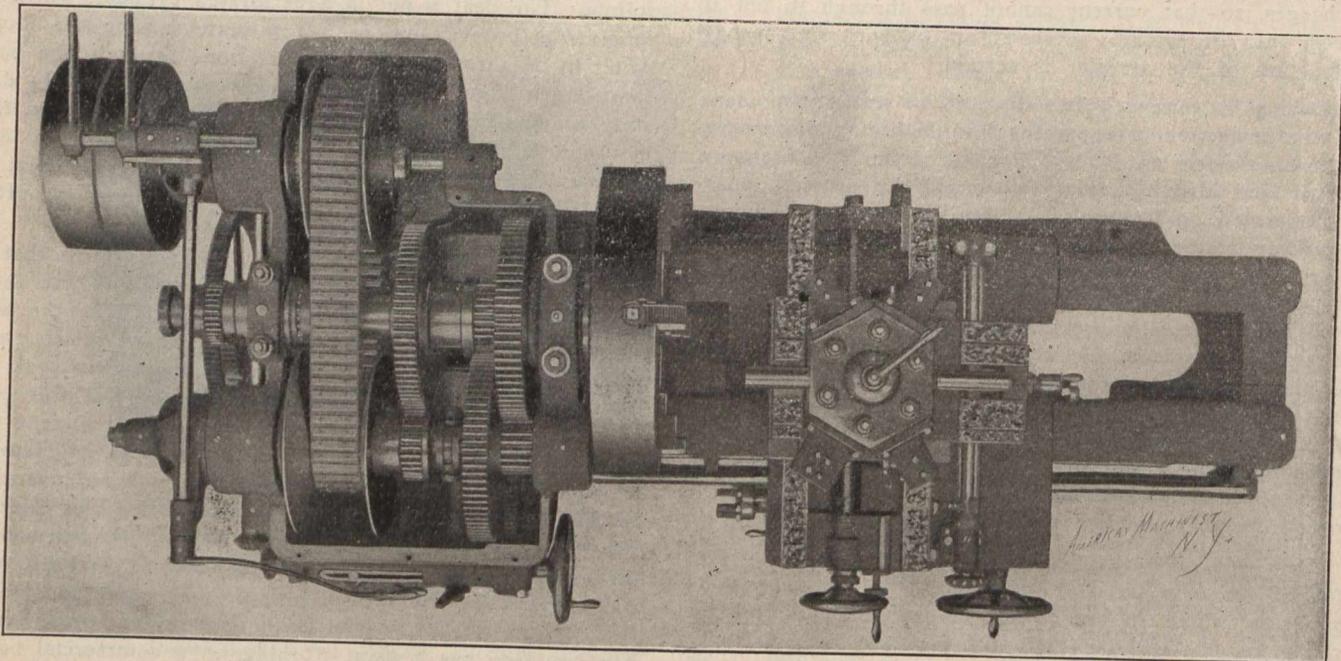


Fig. 2.—Turret Lathe without Gear Case.

The variable speed drive is of great benefit as a time-saver. For instance, suppose a round plate has to be faced across with an ordinary step cone lathe, the proper cutting speed cannot be evenly maintained right across, even if the operator shift his belt several times; with Lang's variable feed motion this is accomplished automatically, and, the hand wheel being connected to the cross-feed screw, the speed increases as the diameter of the job decreases, and maintains a constant surface speed at the cutting point as it approaches the centre, so the full value of the machine and the operator is got from circumference to centre without waste of time. The operation of the cones of this device is by the hand wheel in front of and near the right hand end of the fixed headstock. The turning of this hand-wheel also operates an index, seen projecting through a slot in both illustrations, which index moves along a graduated scale marked in diameter of the work, and the setting of the index to any graduation ensures a speed of thirty feet per minute for work of the diameter indicated, enabling the workman to see at a glance if the speed of the tool is correct for the work.

Another innovation is shown in Fig. 2. A pair of

lathe with the well-known solidity and finish of the British article, and enable the user to take the full value out of the new air-hardening, high-speed tool steel.

Mr. John T. Webster, 109 Niagara Street, Toronto, is Canadian agent, and invites enquiries from those interested.



THE LUNKENHEIMER EXHIBIT AT ST. LOUIS.

In Machinery Hall, Location 5G, Block 26, is the unique exhibit of the Lunkenheimer Company. It is easily identified by a large model of their familiar Valve in Hand, which occupies a prominent corner of their exhibit, as shown by cut. Pyramids of globe, angle, cross, lever and gate valves, of various designs and sizes, both brass and iron, are artistically arranged about the exhibit, and are agreeably off-set by a black plush curtain at the side and rear. The glass cases arranged in front of the exhibit contain a smaller class of the goods manufactured by them,

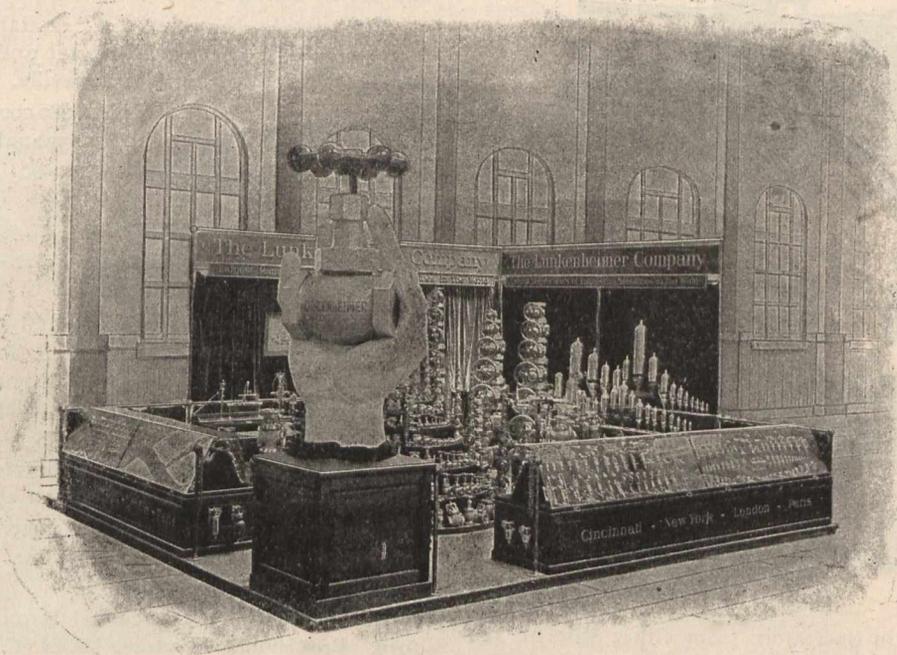
which contain the letters and small parcels, of 20 to 30 miles per hour.

This air current is obtained by power compressing plant at the station buildings, while the transmitting and receiving apparatus and machinery at the terminals become the points of inlets and outlets for the mail matter.

The tubes are ordinary cast iron bell and spigot pattern, bored smooth inside and jointed as usual with lead, when laid in trenches on the roadways.

The carriers for mail matter consist of light, circular steel sheets with external packing rings at each end to slide along the smooth interior of tubes. The turns at streets are made by suitable bends of large radius and slightly greater bore to allow the straight carrier to slide along.

The Canadian Government have placed the work in the hands of John Galt, C.E., M.E., of Toronto. The 10-in. tubing is supposed to be larger than really necessary for the present Canadian experiments, but the wisdom of adopting this size will be recognized when it is considered



such as lubricators, oil and grease cups, cocks, etc., of all sizes. Neat designs of racks containing various sizes of whistles, injectors, pop valves and a variety of other specialties, help to make up an exhibit worthy of notice. A new design of water gauge and an oil-pump for cylinder lubrication are features in themselves. Pipe fittings of every description, safety and check valves and numerous other appliances are found in the exhibit.

The large variety of steam goods exhibited by the Lunkenheimer Co., and manufactured by them, necessitates more than a casual glance to thoroughly appreciate the exhibit in all its details.



POSTAL PNEUMATIC TUBE SYSTEM FOR CANADA.

The pneumatic postal service is rapidly coming into use in the United States. Several systems have been in use for some years in the large cities, notably New York, Chicago, Boston, Philadelphia, and St. Louis, the tubes being mostly 8-in. smooth bore with some 10-in. In Germany, the system has also been started, and the latest reports from England are that 12-in. tube system, in the City of London, is to be installed.

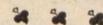
In Canada, Sir Wm. Mulock has taken the initiative and decided to adopt a 10-in. tube system, beginning first in Montreal and Toronto.

The system consists in forcing a current of air through the pipe at a low pressure, giving speed to the carriers

that the life of these under ground will at least be half a century, and by that time they may even prove slightly on the small side.

The extra cost involved over the 8-in. is only slight, and there are other advantages in operating this size, which practically make the system of no greater annual charge. It has also been decided to lay simultaneously a double or quadruple clay conduit pipe alongside and underneath the tube, so that connection can easily be made with electric wires for telephone, light or power between the various stations. This can be done at a trifling cost when tubes are being laid, and should prove a wise and independent provision to make.

We understand, Sir Wm. Mulock has decided to at once call for tenders for all the straight cast iron, smooth bored piping, to be delivered in Montreal and Toronto next May, and by that time the question of location for main post office building contiguous to railway depot should be settled.

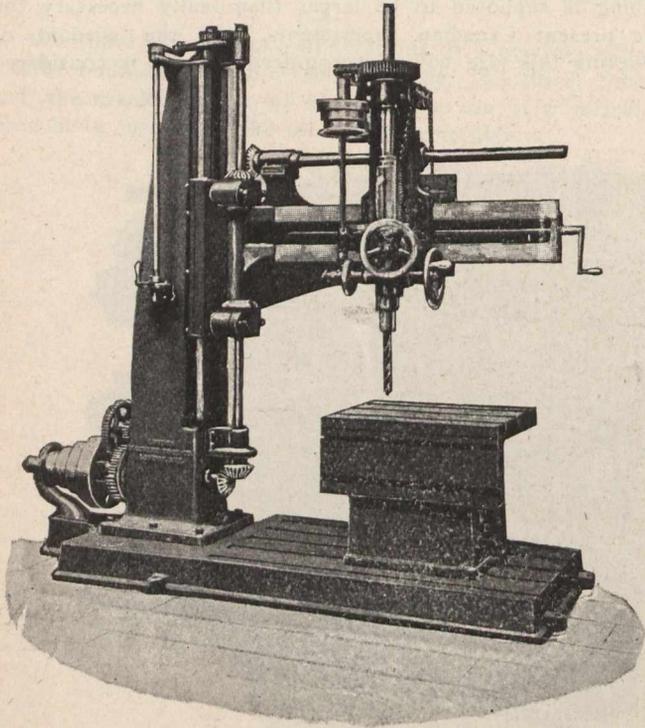


St. John, N.B., is buying two chemical fire engines from the American-La France Fire Engine Co., for \$5,050.

City Engineer Barbour, of St. John, N.B., urges the adoption of a new city water system, bringing water from Loch Lomond. His report shows that less than \$200,000 will procure for the city a high pressure and abundant supply.

NEW TYPE OF HORIZONTAL BORING MILL.

We herewith present a new type of horizontal boring mill, which has lately been put on the market. The capacity of the machine, as shown in the illustration, will bore up to five feet in diameter and six feet in length. The head is large and massive, having five speeds for four-inch belt, the largest diameter of cone being 23 inches, and being powerfully back geared gives ample power for the heaviest work, and permits of high speed steels being used to the best advantage. The boring bar is four inches in diameter, and has a feed of 36 inches without shifting the driving pins. The feeds are reversible, are eight in number, ranging in geometrical progression from 1-128 inches per revolution of spindle to 5-16 inches. This provides a variation suitable for any class of work. The feeds can be thrown in and out



while the machine is in operation from either side of the machine. Hand-feed and quick return is also provided. The table has movement, both crosswise and in a longitudinal direction. The knee is raised and lowered by power or by hand, as desired, the raising and lowering being accomplished by means of a worm and worm wheel placed underneath knee. A facing attachment with variable automatic feed is provided for facing up to 26 inches diameter. The total weight of the machine is 18,000 lbs. It is manufactured by the London Machine Tool Co., London, Ont., who will be pleased to furnish upon application any further information.



NEW INCORPORATIONS.

The Ontario Gazette announces the following incorporations:

The Silver King Gold and Copper Co., capital \$2,000,000, head office at Toronto. Incorporators, H. L. Holmes and W. F. Bross, of Niagara Falls, N.Y.; W. H. Merrill and G. W. Morris, of Buffalo, and H. Denison, of Toronto.

The Fort William Contracting Co., capital \$40,000. Provisional directors, C. W. Jarvis, A. Snelgrove and C. Beaton, all of Fort William.

Twin City Real Estate and Construction Co., capital \$100,000, head office at Berlin. Incorporators, S. Brubacher, of Waterloo; J. Bingeman, J. H. Dudgeon, E. P. Clement and C. P. Hagedorn, of Berlin.

Canadian Talking Scale Co., capital \$100,000, head office Toronto. Provisional directors, A. M. Macdonell, R. W. Ball and T. H. Barton, all of Toronto.

Dominion Cement-Brick Co., capital \$50,000, head office

at Toronto. Provisional directors, W. J. McMurtry, J. E. Webb, A. P. Ingrams, C. Nieuhaus, and J. D. Dobie, all of Toronto.

The Kamloops Lumber Co., incorporated under Dominion charter, has been licensed to do business in Ontario.

The Canadian Michigan Gold Mines, Limited, capital \$1,000,000, headquarters at Sault Ste. Marie, the provisional directors to be W. Coyne, C. J. Brown and J. A. McPhail, of Sault Ste. Marie; E. S. B. Sutton and O. Supe, of Sault Ste. Marie, Mich., and others.

The Bertram Brake Co., capital \$40,000, headquarters at Toronto, to manufacture car brakes. Provisional directors: C. J. Leonard, G. Gibson, C. Heath, F. Pole and C. S. Robertson, all of Toronto.

The Woodruff-Robins Co., capital \$100,000, head office in Toronto, to be constructing engineers, architects and builders. Provisional directors: S. H. Woodruff and F. B. Robins, of Buffalo, and C. W. Winyard, J. Payne, and W. Gilchrist, of Toronto.

Ontario Crude Oil Co., capital \$300,000, head office at Toronto. Provisional directors: J. W. Stokes, of Sarnia, and W. D. Earngey and J. Kynoch, of Toronto.

Orangeville Furniture Co., capital \$60,000. Provisional directors: R. J. Disney, C. Hertel and others, of Hanover, and C. R. McKeown, of Orangeville.

Typograph Limited, capital \$80,000, head office at Windsor, to make machinery for manufacturing light, heat, power, etc. Provisional directors: J. B. Allen, of Detroit; F. H. McPherson and S. B. Best, of Windsor.

Southern Light and Power Co., capital \$300,000, head office in Toronto. Provisional directors: F. J. A. Davidson, C. A. Stone, and D. A. Dixon, all of Toronto.

Alpena Oil and Gas Co., capital \$100,000, head office at Chatham. Provisional directors: S. T. Bell and S. Eagle, of Alpena, Mich.; T. Robinson, of Romney Township, and J. Rutherford and R. L. Gosnell, of Blenheim.

Dominion Roller Screen Co., capital \$150,000, head office at Toronto. Provisional directors: F. A. Mansell, E. Sheetz, J. N. Lynde, C. T. Rodman and W. J. Coutts.

Goderich Cement Brick Co., capital \$40,000, head office in Goderich. Provisional directors: G. Acheson, J. Clark, J. A. McIntosh, and others.

Stratford Chair Co., capital \$60,000, head office in Stratford. Provisional directors: W. H. Crowe, A. J. McPherson, F. A. Nichols, and others.

The Canada Cork Co. has been incorporated with a capital of \$500,000 to take over the business of the Canada Crown Cork and Seal Co., Toronto.

Geo. S. Sinclair & Sons, of Warton, iron founders, have been incorporated with a capital of \$40,000.

The Lakefield Canoe Building and Manufacturing Co. has been incorporated at Lakefield with a capital of \$40,000.

The Eldorado Mining Co., of Arizona, is licensed to do business in Ontario to the extent of \$50,000 capital.

The Aylmer Iron Works Co. has increased its stock from \$30,000 to \$70,000.

The Barrie Carriage Co. has increased its stock from \$40,000 to \$100,000.

The following have been incorporated in Quebec:

La Compagnie d'Eclairage de Saint Georges, capital \$150,000, headquarters at the parish of Saint Georges, Beauce, to produce electricity, furnish light, heat and motive power. The charter members are: G. Cloutier, G. Lamelin, J. J. Lavoie, J. Gilbert, O. Genest, all of the parish of Saint Georges.

La Compagnie de Telephone de Portneuf, with a capital of \$10,000. The charter members are: J. G. McCrea, A. Lambert, P. Dolbec, J. E. Lebœuf, H. Grandbois, A. E. Grandbois, J. Giroux, N. E. Lacourciere, and others, of St. Casimir and adjacent places.

La Compagnie Electrique de la Baie des Ha! Ha!, with capital of \$18,000, headquarters at the town of Chicoutimi, to produce and supply electricity and instal waterworks on

Grande Baie River. The charter members are A. Tremblay, of Hebertville Station, and others.

Dominion charters have been granted to:

The St. Lawrence Construction Co., capital \$20,000, headquarters at Montreal, to buy and sell immoveable property or land. The charter members are: J. Ethier, A. Dansereau, A. Lecompte, H. Audette, of Montreal, and O. Dufresne, of Maisonneuve.



MECHANICAL WOOD PULP.*

By Stanislas Gagne, B.A., Sc.

(Continued from last issue.)

Wet Machines.

Theoretically, when the pulp has been screened, the mechanical process of extracting and preparing fibres from wood is ended, and the product is ready for the paper mill. This is actually the case when the pulp is employed immediately for the production of paper or cardboard, which some of our Canadian mills manufacture, but the large bulk is produced for exportation, and, therefore, has to be put into convenient form for handling and shipping. The wet

provided with outlet pipes, etc. The cylinder cloth must be of very fine construction, so that no pulp will pass through the meshes nor adhere to it too strongly; the ends of the cloth should be sewn together and not soldered, as it is sometimes done, because, at such a soldered connection water will not pass through; hence, no pulp will adhere to that part of the cylinder, and a gash across the sheet of pulp will result with each revolution, thus decreasing the capacity of the machine. The couch roll C is usually made of cast iron, and covered over with soft India rubber, which facilitates the removal of the pulp from the cylinder B by the felt. The felt D is usually about 26 feet long and 72 inches wide, and is woven in a continuous, endless form, of the best wool; grey ones made of Canadian wool are well adapted for the work, and give as good if not a better service than any. Most of the rolls are made of wood with the exception of the roll K. Much care is taken that the collecting roll H, which is formed from a solid piece of hardwood, is made perfectly true and is never allowed to dry, so that the surface will not be cracked nor split. The suction box is covered with a perforated plate, and as the felt passes over, the water is sucked down. Some advocate that the suction box should be connected with the draft tubes of the turbines, instead of suction pumps, but the disturbance and loss of power thereby caused exceeds that involved

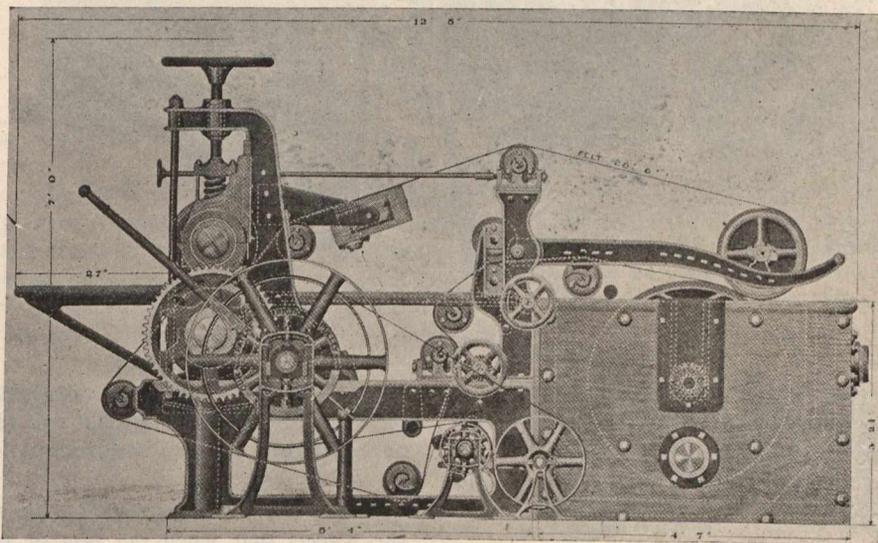


Fig. 32—Wet Machine, Waterous Engine Works Co.

machines are used to extract the pulp from the water, which holds it in suspension, and to turn it into sheet form containing a conveniently low percentage of water. Figures 32 and 33 are cuts of the types mostly used in Canada, and Figure 37 illustrates the principle on which they work. First, there is a vat A, into which the pulp is admitted from the screen trough; the cylinder B, partly submerged, is a frame work covered with very closely woven brass wire cloth, which allows the water to pass through while the pulp it contains adheres to its outside surface, the couch roll C presses the felt D against the cylinder B, causing it to take up all the pulp adhering to the cylinder, leaving the wire cloth comparatively clean; the loaded felt then passes over roller E, which guides its direction over suction box F, which draws out part of the water in the pulp through the felt, over roller G, and between the press rolls H and K; the latter press out part of the water, and the pulp gathers around the upper roll H. The felt, now unloaded, passes over stretch roll L, over roll M, is beaten by beater N, washed by sprinkler P, passes over guiding rolls O and R, between the rolls S and T, which press out the water it contains, over roll V, and again over cylinder B, taking a fresh load of pulp, and so forth, continuously.

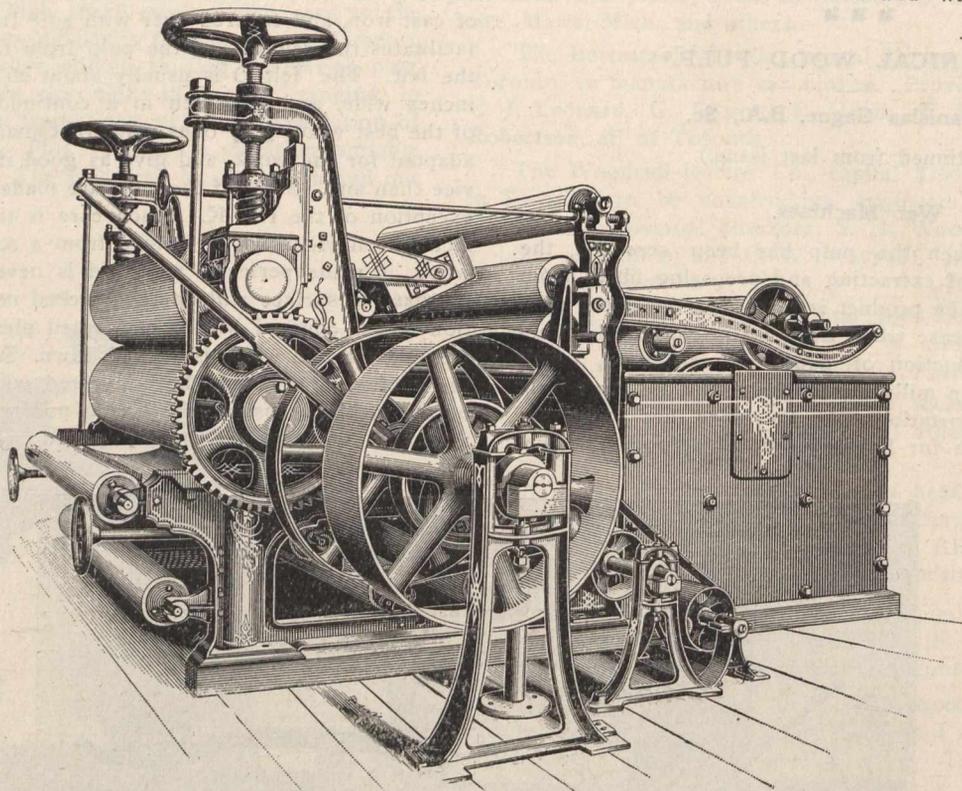
The vat A is made of ordinary pine, is water tight, and

in the operation of pumps. Many mills prefer doing without suction boxes on the wet machines, leaving the work of driving out the water from the pulp partly to the press rolls and partly to the hydraulic presses; they claim that suction boxes wear out the felts much quicker, which seems to me reasonable, and it is a question whether they produce a drier pulp. The press rolls are tightened together by means of a spring and hand wheel at both ends of the collecting roll H, as seen in Figure 33, except in the case of that newly designed by the Jenckes Machine Co., of Sherbrooke, Que., where water pressure cylinders connected to lever arms at both sides of the machine do the work. This plan insures a more evenly distributed pressure between the two rolls, and thereby a more uniform sheet. When a sufficient thickness of separate sheets of pulp have gathered on the collecting roll H, the attendant cuts the sheet with a "doctor" or knife, as shown in cut 33, or by means of a pointed stick of hardwood, which he passes quickly across under the sheets. When the lower end is grasped and the roll allowed to complete its revolution, the sheet falls on the table in front of the machine, where it is folded and sent to the hydraulic presses. The guide rolls are made of wood, on which a certain thickness of cloth is nailed in a spiral form, and by means of a conveniently placed hand wheel can be moved by the attendant to one side or the other, thus keeping the travelling felt in a proper direction. The beater N is made of four arms attached to a revolving shaft, and together with water from the perforated pipe P cleans the felt from all impurities. The press rolls, S and T, are of

*The above paper won the first prize given by the publishers of the Canadian Engineer for the best student's paper presented to the Canadian Society of Civil Engineers for 1903, the judges being members of the Society.

cast iron, and are pressed together by screws; they squeeze the water out of the felt before it takes a fresh load of pulp from the cylinder B. The frame of the machine is of ordinary cast iron. The capacity of an ordinary grey Canadian felt, 72 inches wide, is an average of five tons dry per 24 hours, with a speed of about 50 feet per minute; when new, it will carry more than when partly worn out. These felts last from four to eight weeks, according to the treatment they receive.

After being folded the sheets are put on a truck specially constructed for that purpose, and between each one or two folded sheets such material as old felt or wire netting is inserted; the object of this is to facilitate the removal of the water when pressure is applied. Some mills use wire netting only, but if this is ungalvanized the pulp is liable to become spotted with rust, which much depreciates its value. Felt only will not serve the purpose quite as well as a combination of both felt and wire netting, in which



Wet Machine.

If resinous balsam is used, the capacity of the machine is much lowered, as the resultant clogging of the cylinder produces an irregular layer, which the gummed felt will not pick up entirely. The cleaning is done as in the case of the screens, by steam and coal oil.

Handling and Pressing.

The sheet of pulp from the press roll, usually $\frac{1}{8}$ to 1-10 of an inch in thickness, is folded on the wet machine table so that there are no edges showing on the outside and ends, the final sheet being about 24 by 16 inches in size when a

case a piece of felt is inserted between each sheet and a piece of wire netting between two pieces of felt every three or four sheets. When the truck is loaded it is rolled to the presses.

This truck is constructed with such a distance between the wheels that when the ram or platen of the press rises it is borne up with its load of pulp, which is pressed without any injury to the truck, thus dispensing with unloading it. Figure 36 illustrates the principle of a hydraulic press very commonly used. The truck is driven over ram R, and water pressure is admitted in cylinder C through the opening and

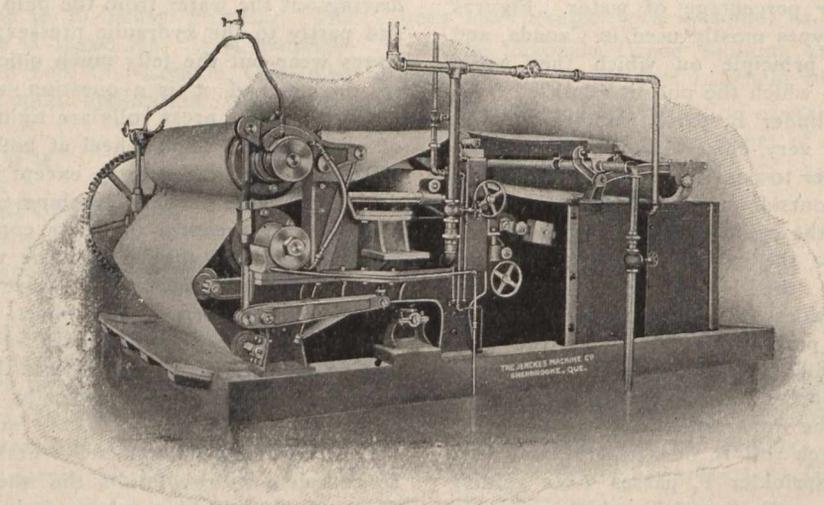


Fig. 33—Wet Machine (Jenckes Machine Co.).

72-inch wet machine is employed. This pulp contains about 65 per cent. or so of water, depending on the use or disuse of a suction-box and on the pressure between the press rolls. As the cost of shipping such a combination of 65 per cent. of water and 35 per cent. of pulp would be uneconomical, and in most cases prohibited, the percentage of water is reduced by means of hydraulic presses.

pipe D on piston E; the pulp sheets are pressed between ram R and top F by an amount depending on pressure admitted at D and on the size of piston E in cylinder C. The whole press is of very heavy construction, the lower frame of cast iron having a brass-lined cylinder, the piston and rod being made of steel, while the top piece and the platen are of cast iron; the top piece is supported and kept in place

by means of four heavy steel rods, with screw and nuts at both ends. (See Figure 42.) The pressure used is from 1,500 to 5,000 lbs. per square inch, and is supplied by triplex pressure pumps of usual design. In order to move the platen of the press more rapidly up before it starts to press and down after pressing, the cylinder is usually connected to a low pressure pump, or the discharge from the bottom of the cylinder may be let into the air, allowing the platen

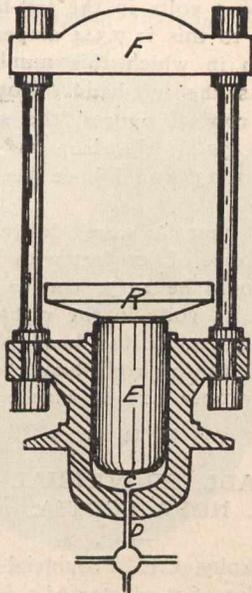


Fig. 36—Hydraulic Press.

to force the water out by its own weight. The percentage of water in the pulp after pressing is usually 50 per cent. This varies sometimes from 45 to 55 per cent., depending on the pressure applied and on the felting between the sheets, but not to any practical extent on whether a suction-box and very high pressure between press rolls have been

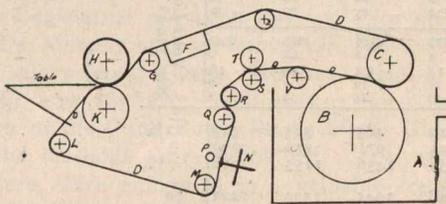


Fig. 37—Sectional Elevation of Wet Machine.

used in the wet machine. The object of the pressure is to get that percentage of water as low as possible, and their practical limit is reached when the pulp contains about 45 per cent. of water. To reduce this percentage other methods with heat as an agency must be employed; these will be considered later.

Baling.

After being pressed the pulp has to be baled into bundles suitable for shipment. From the presses the trucks are rolled to scales, where a sufficient number of sheets are weighed to form a standard uniform weight of dry or wet pulp. This standard weight or amount of pulp is then removed to a press. This consists of cast iron top and bottom, held together by four steel rods. The pressing is accomplished by means of two knees spread out or drawn in by a screw and sprocket wheel driven by a chain, and the driving is so arranged that when a certain pressure is applied the driving pulley falls out of gear and automatically stops pressing. When the pulp is placed in this press, two or three layers are laid under and on top of it, and while subjected to pressure the whole is tied by means of four or five wires inserted in grooves at the top of the bottom casting and at the bottom of the follower. Pressure is then relieved, and the bale is ready for shipment.

Sometimes a wrapper is used, but it is often found more expensive than the loss of pulp occurring without. If there is a chemical pulp mill in connection, a sheet made by this process will be tough, and answer the purpose very well, and at a small cost.

Tests.

There are two kinds of tests, for quality and for percentage of water. For testing the quality of the pulp at the mills the following methods are largely used. A glance at the sheet from the wet machine with a strong magnifying glass will tell the maker whether the pulp is too coarse or too short. Again, as the sheet, $\frac{1}{8}$ or 1-10 of an inch thick, issues from the wet machine or from the hydraulic press a piece may be torn off and folded twice; if no cracks or splits appear after this operation the pulp is considered good. Again, a thin sheet when held to the light should not exhibit too large splinters or chips. There are many other such simple tests that may be made, and are employed by different manufacturers. The tests for determining the quantity of water in the pulp are performed by taking samples through different parts of the bales and weighing them

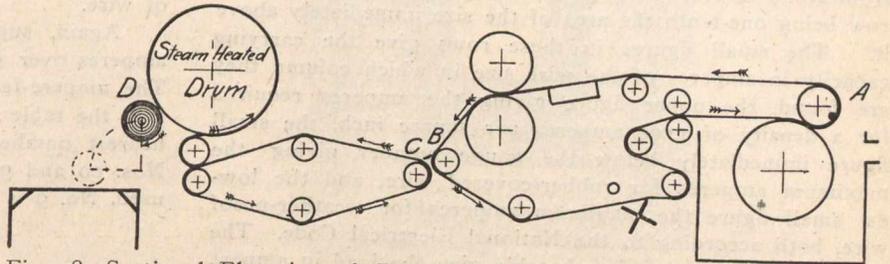


Fig. 38—Sectional Elevation of Dry Pulp Machine. From A to B is same as ordinary Wet Machine. From C to D is the Drying Part

immediately, and then again after they have been dried by heat. The difference in weight gives the percentage of water in the pulp. This is a very delicate operation, one which requires skill and judgment. The percentage of water in a bale differs at various parts throughout the bale, being, immediately after pressing, greater at the edges than in the centre. The percentage also varies constantly from the time the bale is pressed until it is used at the paper mill, due to the drying up of the sides. The weight also changes from loss of pulp in manipulation and handling. These variations, which are the cause of constant disagreements between purchaser and seller, have originated a movement at present towards standardizing methods of testing. The most satisfactory method of determining a weight agreeable to both purchaser and seller is for both parties to determine the percentage of water in the bales when it is most uniform, i.e., just as it issues from hydraulic press.

Yield.

As mentioned before, this mechanical process transforms into pulp practically all the solid substances of the wood except the bark, the only loss occurring in the splinters that pass through unground or which are too large to pass through the screen holes. A cord of green spruce weighing 4,400 lbs. will weigh about 3,700 lbs. after being barked. This will produce on the average 1,900 lbs., or 51 per cent. of the weight of the green wood, the remaining 49 per cent. being water in the cord and the waste occurring through the process. Such a cord of wood treated by the soda or sulphite process would yield from 100 to 1,300 lbs. of dry pulp.

(To be continued.)



At a recent meeting of the directors of the Quebec Central Railway, held in London, England, Frank Grundy, general manager, was elected vice-president of the company. Mr. Grundy has been manager of the road for fifteen years. He was earlier with the Manchester, Sheffield and Lincolnshire Railway.

At the meeting of Toronto No. 1, C.A.S.E., at their hall on Victoria Street, August 3rd, W. J. Webb, who is about to leave Toronto for Winnipeg, and who has been financial secretary of the Association for several years, was presented with a very handsome gold Albert chain, with locket, suitably engraved. The presentation was made by H. E. Terry, president of the Executive, who made a few suitable remarks, and, while Bro. Webb was taken entirely by surprise, he made a neat reply.

UNIVERSAL WIRING TABLE.

Arthur R. Roe, in American Machinist.

In arranging the accompanying table, advantage has been taken of the fact that in the B. & S. gauge, wires from 0000 to 6 have ten times the cross-sectional area of wires from 7 to 16. For instance, No. 1 has an area of 83,694 circular mils and No. 11 has 8,234 mils; No. 4 has an area of 41,742 circular mils, and No. 14, 4,106 circular mils. So, whatever current No. 1 or No. 4 will carry at a given "drop," No. 11 or No. 14 will carry respectively one-tenth of that current with the same drop.

In the table the large figures in the two upper horizontal rows give the sizes in B. & S. gauge, the sizes from No. 0000 to No. 6 occupying the upper row, and the sizes from No. 7 to No. 16 the lower row, each size in the lower row being one-tenth the area of the size immediately above it. The small figures in these rows give the carrying capacity in amperes of the wire size in which column they are found, the upper figure giving the amperes required for a density of 1,000 amperes per square inch, the small figure immediately below the gauge number giving the maximum amperes for rubber-covered wire, and the lowest small figure the maximum amperes for weather-proof wire, both according to the National Electrical Code. The numbers in the body of each table give the load in ampere-feet (ampere \times distance or length of one wire), for the different wire sizes. The left-hand vertical column applies to the upper row of wires and the right-hand column to the lower row.

The table becomes universal by applying any multiple or sub-multiple of 10. For example, at one volt loss No. 0000 wire has a capacity of 9,842 ampere-feet, and at 0.1 volt loss the capacity is 98,422 ampere-feet. Similarly, at 10 volts loss the capacity is 98,418 ampere-feet, and at 100 volts it is, of course, increased tenfold.

drop and wire size that correspond to any given number of ampere-feet. For example, if the ampere-feet should be 9,500, the table shows that No. 0000 wire will carry this load at 1-volt drop, No. 000 at 1¼ volts drop, No. 0 at 2 volts drop, No. 1 at 2½ volts drop, No. 3 at 4 volts drop, and so on. To illustrate the use of the table more explicitly, suppose it is desired to deliver 10 amperes over a line 700 feet long with a loss of 3 volts. The ampere-feet will be 10 \times 700 = 7,000. Referring to the 3-volt line of the table, taking the 3 volts in the left-hand edge column, the nearest number to this is 7,344 ampere-feet, and at the head of the column in which this number is located are Nos. 3 and 13. As the left-hand "drop" column applies only to the upper row of figures, the size of wire to be taken would be No. 3. If the drop had been 30 volts instead of 3, then No. 13 would have been the proper size of wire.

Again, suppose that it were desired to deliver 15 amperes over a distance of 600 feet with a drop of 15 volts. The ampere-feet would be 15 \times 600 = 9,000, and tracing into the table from 15 volts in the right-hand column, the nearest number is 9,284; at the head of this column are Nos. 00 and 9, and as the right-hand "drop" column was used, No. 9 is the proper size of wire.



RODERICK McCALL, PROVINCIAL ENGINEER OF NOVA SCOTIA.

Dr. Martin Murphy, C.E., Provincial Engineer of Nova Scotia, after a service of a quarter of a century, has retired, and is succeeded by Roderick McCall. Mr. McCall is about thirty-five years old, and was born at New Glasgow, N.S. He was educated at the High School in that town, at Pictou Academy, and at the Royal Military College, from which college he graduated at the age of nineteen. The class of

Volts Loss Nos. 0000 to 6 Wire.	211,600	167,805	133,079	105,692	83,694	66,378	52,633	41,742	33,102	26,250	Volts Loss Nos. 7 to 16 Wire.
	167 0000 210 312	132 000 177 262	105 00 150 220	82 0 127 185	66 1 107 166	52 2 90 131	41 3 76 110	34 4 65 92	26 5 54 77	20 6 46 65	
	20,816	16,508	13,091	10,881	8,224	6,529	5,178	4,106	3,256	2,582	
	16 7	13 8	10 9	8 10	6.5 11	5 12	4 13	3 14	2.5 15	2 16	
	39 55	33 46	26 37	24 32	20 27	17 23	13 19	14 16	15 12	10 8	
¼	2460	1951	1547	1228	973	772	612	485	385	305	2½
½	4921	3902	3095	2455	1946	1543	1224	971	770	610	5
¾	7381	5853	4642	3683	2919	2315	1836	1456	1155	916	7½
1	9842	7805	6190	4911	3893	3087	2448	1941	1539	1221	10
1¼	12,302	9756	7737	6139	4866	3859	3060	2427	1924	1536	12½
1½	14,763	11,707	9284	7367	5839	4631	3672	2912	2309	1831	15
1¾	17,223	13,658	10,832	8594	6812	5402	4284	3397	2694	2136	17½
2	19,683	15,609	12,379	9822	7785	6174	4866	3883	3079	2442	20
2¼	22,143	17,561	13,927	11,050	8759	6946	5508	4369	3464	2747	22½
2½	24,604	19,512	15,474	12,278	9732	7718	6120	4854	3849	3052	25
2¾	27,065	21,463	17,022	13,506	10,705	8490	6732	5339	4234	3357	27½
3	29,525	23,414	18,569	14,733	11,678	9261	7344	5825	4619	3663	30
3¼	31,986	25,365	20,117	15,961	12,651	10,033	7956	6310	5004	3968	32½
3½	34,446	27,317	21,664	17,189	13,625	10,803	8568	6795	5388	4273	35
3¾	36,907	29,268	23,211	18,417	14,598	11,577	9180	7281	5773	4578	37½
4	39,367	31,219	24,759	19,645	15,571	12,349	9792	7766	6158	4884	40
4¼	41,827	33,170	26,306	20,872	16,544	13,120	10,404	8251	6543	5189	42½
4½	44,288	35,121	27,854	22,100	17,517	13,892	11,016	8737	6928	5494	45
4¾	46,748	37,073	29,401	23,328	18,491	14,664	11,628	9222	7313	5799	47½
5	49,209	39,024	30,949	24,556	19,464	15,436	12,240	9708	7698	6105	50
5¼	51,669	40,975	32,496	25,784	20,437	16,208	12,852	10,193	8083	6410	52½
5½	54,130	42,926	34,044	27,011	21,410	16,979	13,464	10,679	8468	6715	55
5¾	56,590	44,877	35,591	28,239	22,383	17,751	14,076	11,164	8853	7020	57½
6	59,051	46,829	37,139	29,467	23,357	18,523	14,688	11,649	9237	7326	60
6¼	61,511	48,780	38,696	30,695	24,330	19,295	15,300	12,135	9622	7631	62½
6½	63,972	50,731	40,233	31,929	25,303	20,067	15,912	12,620	10,007	7936	65
6¾	66,432	52,682	41,781	33,156	26,276	20,838	16,524	13,105	10,392	8241	67½
7	68,892	54,633	43,328	34,378	27,249	21,610	17,136	13,591	10,777	8547	70
7¼	71,353	56,585	44,876	35,606	28,223	22,382	17,748	14,076	11,162	8852	72½
7½	73,813	58,536	46,423	36,834	29,196	23,154	18,360	14,562	11,547	9157	75
7¾	76,274	60,487	47,971	38,062	30,169	23,926	18,972	15,047	11,932	9462	77½
8	78,734	62,438	49,518	39,289	31,142	24,697	19,584	15,533	12,317	9768	80
8¼	81,195	64,390	51,066	40,517	32,115	25,469	20,196	16,018	12,702	10,073	82½
8½	83,655	66,341	52,613	41,745	33,089	26,241	20,808	16,503	13,086	10,378	85
8¾	86,116	68,292	54,160	42,973	34,062	27,013	21,420	16,990	13,471	10,683	87½
9	88,576	70,243	55,708	44,201	35,035	27,785	22,032	17,472	13,856	10,989	90
9¼	91,036	72,194	57,255	45,428	36,008	28,556	22,644	17,959	14,241	11,294	92½
9½	93,497	74,145	58,803	46,656	36,981	29,328	23,256	18,445	14,626	11,599	95
9¾	95,957	76,097	60,350	47,884	37,955	30,100	23,868	18,930	15,011	11,904	97½
10	98,418	78,048	61,898	49,112	38,928	30,872	24,480	19,416	15,396	12,210	100

In order to use the table it is only necessary to multiply the single distance in feet (the length of one wire) by the load in amperes. As above stated, the product is ampere-feet, and the table shows all the combinations of

that year numbered eighteen, and some of its members have already won distinction. All but six of these young Canadians accepted commissions in the Imperial service. Two of them—Capt. Hensley and Capt. Laurie—fell in the South

African war. Two others—Major Cartwright, R.E., and Lieut.-Col. Kirkpatrick, D.A.Q.M.G.—are now in the Halifax garrison, and a fifth is Sir Percy Girouard, the famous Canadian engineer who has distinguished himself in South Africa. After leaving college Mr. McCall went into railway work, and was employed on various provincial railway surveys. His first important work was in the construction of the C.P.R. short line through Maine, in which he was associated with his class-mate, Girouard. He was subsequently in charge of the Middleton end of the Nova Scotia Central Railway, and resigned that position to become



Roderick McCall, Provincial Engineer, Nova Scotia.

engineer for the New Glasgow Iron, Coal & Railway Company, now the Nova Scotia Steel & Coal Company. In 1890 he became Deputy Provincial Engineer, in which position he gave such satisfaction that in 1902 the duties of the Engineering Department were divided, and Mr. McCall was given entire charge of the roads and bridges of the Province, with the title of Assistant Provincial Engineer, while Dr. Murphy retained control of the railways. At the last session of the Legislature provision was made for the super-annuation of Dr. Murphy with an annual allowance of \$2,000, Mr. McCall's salary being \$3,000. He has made a special study of bridge and highway construction. Last summer he made a tour of the Good Roads States of the Union, and investigated the methods there employed. The results of his investigations were embodied in a valuable report presented to the Legislature, and indirectly led to the appointment of C. C. Coutlee, C.E., of Aylmer, Quebec, as Good Roads Instructor for Nova Scotia. In addition to his valuable work in connection with the construction of bridges in this Province, he made a survey in 1890 for the proposed widening and deepening of St. George's Harbor, Bermuda, and in 1894 visited the New England States to report on the two-foot gauge railways in operation there.



AN EMERGENCY BRASS FURNACE.

While visiting a small repair shop and foundry recently, the writer saw a small brass furnace that was characteristic of the place. They started to build a furnace for using of crude oil as fuel, but before the furnace was completed a hurry-up order came in for a heavy brass casting. There was not sufficient time to send to the nearest foundry, so a half-finished furnace was hurried into condition for a coal fire and charged. An air pipe for furnishing blast to the furnace had already been placed in position and the shell was simply placed over this and lined with fire brick, the fire was started and anthracite coal packed about the crucible. The blast was then turned on, and in an unusually short time the metal was ready to pour. The results were so satisfactory that all thought of further improvement was abandoned and the furnace is still in use as it was so hurriedly pressed into service. A description of the construction of the furnace may be of interest to others who require some device for melting small quantities of brass occasionally. Fig. 1 shows a section of the furnace. It

consists of an outer shell A, lined with firebrick, as shown at C. The bottom of the furnace is all composed of firebrick. The cast iron cover F is provided with an iron handle G. The products of combustion escape through nicks cut on the edge of the brick work, as shown at H. Dimensions are shown on illustration. The blast is taken from a small centrifugal blower which supplies the blast for the forges

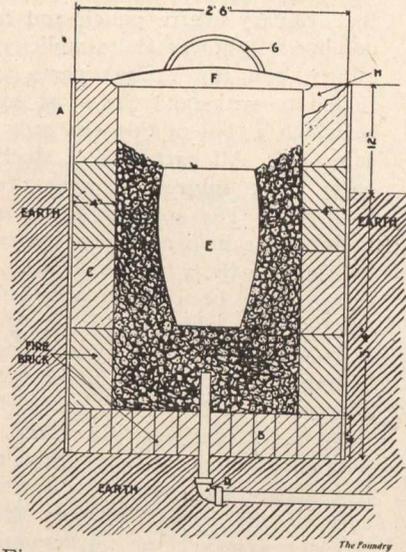


Fig. 1.—An Emergency Brass Furnace.

in the smith shop, and is introduced through a one and one-quarter-inch pipe, shown at G. This pipe extends about four inches above the bottom of the furnace. The fuel consists of anthracite coal of about grate-size. A bed of about 8 to 12 inches thick, depending upon the charge to be melted, is placed in the bottom of the furnace and the crucible E, set on top of it; coal is then filled in around the sides of the crucible up to the top, as shown. Fig. 2 shows



Fig. 2.—An Emergency Brass Furnace.

the general appearance of the furnace as installed in the shop. The crucible can be seen standing at the right and the cover at the left.

Charges of from 200 to 350 pounds can easily be melted in this furnace and by having a second crucible charged, ready for introduction into the furnace as soon as one is removed, it is possible to melt from three to four charges in succession. In the latter case the coal filled in about the first crucible falls down to form the bed for the succeeding one.—C. B. A. in Foundry.



—A party from the British Antarctic expedition ship Discovery penetrated to the 82nd degree in December, 1902. This is the most southern point ever reached.



—By arrangement with Brown, Boveri & Cie., electrical engineers, of Baden, Switzerland, the Crocker-Wheeler Co., of Ampere, N.J., have secured their alternating current designs, patents and rights to manufacture in America, and have retained them as consulting engineers.

AUTOMATIC CENTRE PUNCH.



The Brown & Sharpe Mfg. Co., of Providence, R.I., have brought out a new Automatic Centre Punch of entirely new design. It has features that make it much more convenient and accurate for laying out work to be machined or drilled than the ordinary centre punch and hammer. It combines lightness and simplicity with durability, and the various parts are proportioned to withstand the most severe usage to which a tool of this character should be subjected. All parts are of steel and those parts most subject to wear are carefully hardened. The tool is self-contained, the striking mechanism being enclosed in the knurled handle, which is of such a size and form as to be conveniently held in the hand. It is about $5\frac{1}{4}$ -in. long and $\frac{5}{8}$ -in. diameter. When following a line or establishing a point by the intersection of lines, one hand can be free to guide the point or hold the magnifying glass, and, after the point is located, it is not apt to slip and lose the setting, as just a downward pressure of the handle releases the striking block and makes the impression. Another

advantage appreciated by mechanics is that the punch marks are all of uniform depth, and, therefore, more easily and accurately followed than when of varying depths.



TOWN LIGHTING BY ACETYLENE.

Although the discoverer of the commercial production of acetylene gas from calcium carbide is a native of Canada, and this country figures largely in the manufacture of carbide, progress in the lighting of towns by acetylene gas has been more marked in other countries, notably in Europe, than here. Acetylene lighting has made more headway in Western Canada than in the eastern Provinces. Birtle, Carberry, Virden and Moosomin are lighted by acetylene and Souris, Deloraine and Gladstone are either equipped or are being equipped with acetylene plants. The tanks, or gas-holders, have in each case, we understand, a capacity of 3,000 cubic feet, and supply from one or two hundred up to several hundred lights. In each of these towns the system appears to give satisfaction, and the number of consumers is being steadily increased. Among Ontario towns that have adopted acetylene are North Bay, Bradford, Rodney, Aurora, Oshawa, Bolton and Milverton.

The largest, as well as one of the most successful, acetylene plants in Canada is that at North Bay, a town of between 4,000 and 5,000 inhabitants, at the junction of the Canadian Pacific Railway main line with the branch of the Grand Trunk connecting with Toronto. This plant is operated by the North Bay Gas Co., of which A. F. Leggatt is president and manager, A. G. Browning vice-president, and John Ferguson, Wm. Martin and S. and D. Purvis, the other directors. Construction on the plant was started in the autumn of 1902, but it was not put into operation till April, 1903, when it began with 180 lights. There was then in operation an electric lighting system, owned by another company, which had been in existence about twelve years, generating its electricity by steam. At the time the acetylene plant started, the electric system had about 1,500 lights, and is reported to have about 1,800 now. In the same time the acetylene plant has increased its services from 180 to 1,200, and is extending at the present time at the rate of 100 services a month. The gross income of the acetylene plant is now \$4,000 a year, and it is claimed that the net profits of the plant are greater than that of the electric plant, which has a gross income of about \$9,000. In the case of the acetylene plant the manager and one assistant do the entire work, and the supply of gas and of connections can be considerably enlarged without any increase of the

staff. In fact, the same staff operates the plant now that was required when there were only one-fifth as many lights. The company expects to pay a dividend of 7 per cent. this year.

The gas tank holds 4,000 feet of gas, and at each fresh charge carbide is put in to make 1,000 feet. An interior view of the generating station is here shown, and this equipment is sufficient for 8,000 lights. The company paid \$60 a ton for carbide till last year, when the price was increased to \$65. To this freight has to be added, making it about \$70 a ton. The company charges its customers \$1.75 per 100 feet (equivalent to 1,000 feet coal gas), with a discount of $12\frac{1}{2}$ per cent., making the net price \$1.53, with no charge for meter, against a charge of 15 cents per 1,000 watts, with 25 cents per month for meter charged by the



A. F. Leggatt, President and Manager, North Bay Gas Co.

electric company. This makes the net price slightly in favor of acetylene for the same candle power of light. In practice, the advantage is still more in favor of acetylene for the lighting of stores, it is claimed, because there being no electric current on during the day, the consumer cannot use the electric light on dark days or in cellars. A half foot burner gives a 24-candle power light, which, with a simple installation, yields a good, strong illumination, the character of the light being a nearer approach to daylight. This appears to be a consideration with many merchants, especially dry goods dealers, and consequently most of the shop lighting in North Bay is now done by the acetylene plant. The C.P.R. station is also lighted with it.



Interior of Generating Station, North Bay Gas Co.'s Acetylene Plant.

As against coal gas, acetylene lighting in Canada for towns and villages would appear to have some substantial advantages.

The first of these is that acetylene gas mains and service pipes need not be laid below the frost line. The troubles of last winter will be remembered by coal gas people as well as waterworks people; but in North Bay.

where the mains are laid only six inches below the surface, and in some cases actually exposed above ground, or placed immediately under the sidewalk, there was not a single case of freezing, though the thermometer registered 50 degrees below zero on one or two occasions. The mains were opened three times last winter to lay new connections, but the pipes were found to be "dry as punk," to use the words of the manager. This, of course, means a considerable saving in the cost of laying pipes, as well as in the convenience of taking them up or laying new connections. In laying the mains here a sheet iron "drip box," about 12 inches long and 6 or 8 inches deep, is, however, put in wherever there is a depression in the level of the main, which is led through the box near its top and provided with a cock to let off any condensation that may develop.

The second advantage for a small town is the smaller cost of installation. An acetylene plant for a town the size of North Bay will cost about \$12,000, whereas the cost of a coal gas plant would be about \$60,000.

The third advantage of acetylene is the small cost of maintenance, as before shown, and the relatively small cost of extensions, this difference applying not only to extensions at the generating stations, but extensions of main and service pipes.

The fourth advantage of acetylene over coal or water gas—and it is an important one—is that it is infinitely less poisonous. In 10 hours not more than about 5 feet of acetylene would pass through an ordinary burner, and if the peculiar smell of acetylene did not disclose itself to the occupant of a room it would at least fall short of fatal effects, whereas fifty feet of coal or water gas would pass through a burner in the same time, and the frequent items in the daily papers tell with what effect.

Fifth, naked acetylene lights do not flicker as coal gas lights do, and are therefore not so trying to the eyes.

Sixth, acetylene lights of corresponding power do not vitiate the air to the same degree as coal gas lights.

For the operator of the acetylene plant, as well as for the operator of the coal gas plant, there are by-products, as the refuse carbide affords a serviceable quality of slack-lime for plasterers' use and for fertilizing purposes, being sold for these purposes at \$5 a ton.



THE TORONTO NIAGARA POWER CO'S. TRANSMISSION LINE.

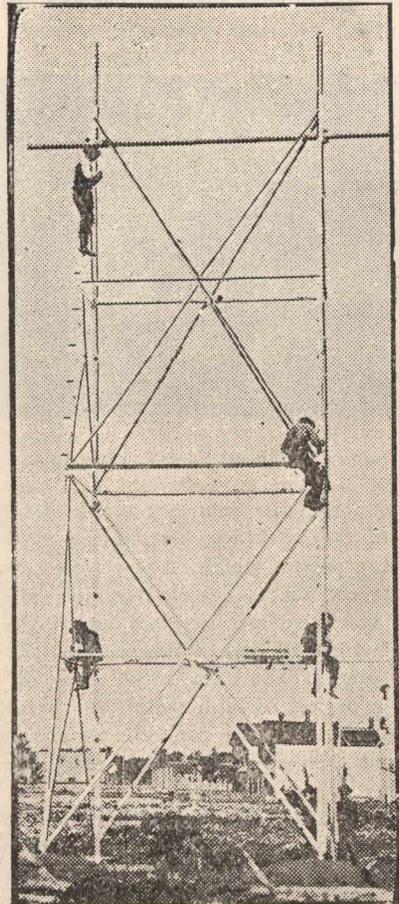
The transmission line which is to carry power from the generating station at Niagara Falls to the distributing station in Toronto is now under construction. The terminal station in the north-west of Toronto is being erected, and conduits are being laid from that point to sub-stations of customers of the company. Everything is being got ready for the advent of the "juice," which, it is expected, will reach the city in the course of a few months.

The transmission line is of interest, as it is the first of its kind in Canada. Experience with similar undertakings in Mexico and elsewhere is being put to service in the construction of the Canadian line, with adaptations to local conditions as necessary.

The right of way (the route of which was shown in a cut published in the June number of the Canadian Engineer) has an average width of eighty feet, and will be flanked by two lines of steel towers carrying the conductors. The line consists of four three-phase circuits, to be operated at 60,000 volts, two circuits being carried by each line of towers. The towers are constructed of galvanized steel angles bolted together with bracing similar to the usual design of windmill towers. They will be forty-six feet high, having a base fourteen feet by twelve feet. Lengthwise of the line each tower will have a uniform width of fourteen feet from bottom to top, but crosswise the width of twelve feet at the bottom will diminish, the sides coming together at the top. A steel pipe will form a cross-bar, carrying four steel pins, on which insulators will be placed. The other two insulators will be placed on vertical steel pipes, so that the conductors of each circuit form an

equilateral triangle, with a horizontal base of six feet. The towers will be sunk about six feet in the ground, each foot resting on a cedar block, and braced with other blocks, upon which the earth will be solidly rammed. Wherever the nature of the soil demands it, a concrete foundation will be used. Towers will be bolted together in a horizontal position and raised to the vertical by means of a derrick.

The above is the description of the typical tower, which is designed to withstand a side strain of 10,000 pounds applied to the top. The towers will be spaced 400 feet apart, and about 1,200 of them will be used, a large part of which quantity is being furnished by the Canada Foundry Co. Where unusual conditions exist, special towers will be



Steel Tower used in transmission line of the Toronto & Niagara Power Co.

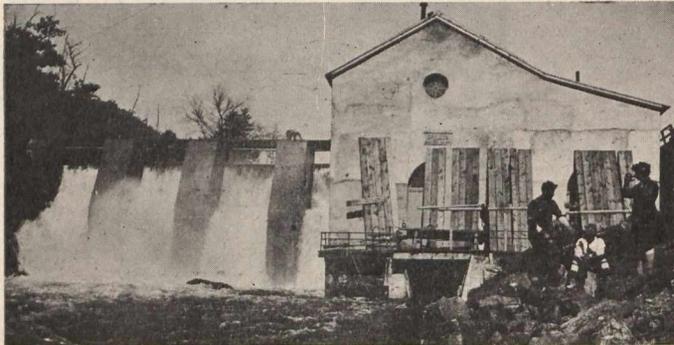
provided. At curves the towers will be placed at shorter intervals, and so constructed that they will be equal to the strain without guys. At the crossing of the Welland Canal towers will be erected of special height to allow the passage of ships below the conductors, and the same will be done at the Hamilton Bay Gap. With few exceptions the line passes through a practically level country and presents few difficulties in construction.

The insulators will be glazed brown porcelain, in three or four parts. The parts making up the insulator will be cemented together and the insulator cemented to the steel pin. The insulator will be about fourteen inches in diameter of top umbrella, and about fourteen inches high over all.

The conductor will be composed of six strands No. 6 copper wire wound about a hemp core. The combined area of the strands is 190,000 circular mills, and a high conductivity with a high tensile strength and elasticity is obtained. Tests with this cable show that an elastic limit exceeding 35,000 pounds per square inch can be obtained with an ultimate tensile strength of 55,000 pounds per square inch. The cable, which will be supplied by the manufacturer in lengths of 3,000 feet, will be joined by twisted copper sleeves unsoldered, and copper tie wires will be used. Low temperature, wind, sleet, etc., have been provided for in the spacing of the towers and the amount of sag to be allowed. Lightning arresters of ample capacity will be placed at various points on each circuit, each arrester being provided with a knife-switch for disconnecting it from the transmission line.

FAILURE OF THE ORILLIA DAM.

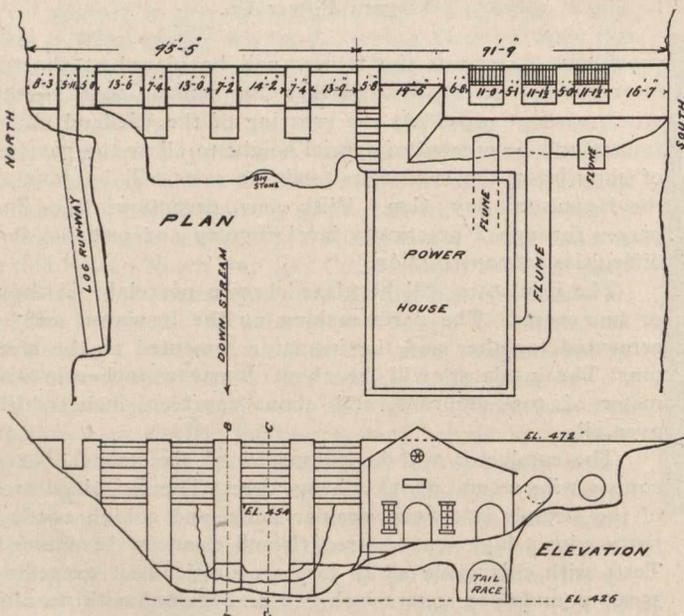
The dam from which power is generated for the town of Orillia is situated in a gorge of the Severn river, 19½ miles from the town. Before the dam was built, there was a fall in the river of about 35 feet at this point, where the banks are formed of granite rock. The construction of the dam was started in the autumn of 1898 by a firm of Buffalo contractors, but their progress was so slow that the work was taken out of their hands and given to another contractor, who appears to have expressed his doubts of the plans handed over to him, partly for the reason that the foundation of one side of the dam was not upon solid granite, but upon portions of the rock that had become disintegrated and reduced to a bed of sand. However, he took over the con-



Orillia Power Dam.

tract and completed the dam, but a considerable and essential portion of the work was carried out in the winter time and in running water, which, it is claimed, washed out the cement. The contractor denies this, and alleges that the break was caused by the washing out of the disintegrated rock at the bottom of one of the sections shown in the accompanying plans. The dam broke away on the 7th April last, during a period of high water, the break having commenced at the bottom, the concrete portion being first carried away and then two sections of the upper works, one after the other.

The dam consisted of two sections, the total length being 185 ft., of which the power house and flumes took up 92 ft. and the spillway portion 93 ft. A correspondent of the Canadian Engineer, who visited the site after the break, describes it as follows:



Plan and Elevation, Orillia Power Dam.

“Portland cement concrete was used for the dam throughout, the stream bed and banks being rock. The south half, or power house portion, containing the gates and flumes were founded upon a ledge of solid rock at the elevation shown, which was well out of the way of the running stream. The north half, or spillway portion, consist-

ing of two types of section, one of which we will call section B-B, running up to the top level of the dam, as a continuous concrete wall, or pier, the other as per section C-C, only to an elevation of 18 feet below the top of dam, and being supplemented by stop logs to bring it to high water level, sections C-C alternating in between sections B-B, as shown.

The area of the section B-B, at the position where it attains the greatest height of wall, viz., 46 feet is 970 sq. feet, which at 140 lbs. per cubic foot, will weigh 135,800 lbs.

The area of adjoining section C-C will equal 590 sq. feet, which at 140 lbs., will weigh 82,600 lbs.

Multiplying B-B by its length of 7 feet 2 inches, and C-C by its length of 14 feet 2 inches, we have 966,600 lbs. + 1,169,610 = 2,136,210 lbs.

Now the total pressure upon such surface, 21 feet 4 in., in length of a dam 46 feet in height, will equal 1,411,107 lbs., giving a co-efficient of friction of .660.

The overturning moment of the water pressure will, upon the length of 21 feet 4 inches, equal $1,411,107 \times \frac{46}{3} = 21,636,974$ ft. lbs. The stability of the section will equal $966,600 \times 12 = 11,599,200$
 $1,169,610 \times 14 = 16,374,540$
 27,973,740 ft. lbs.

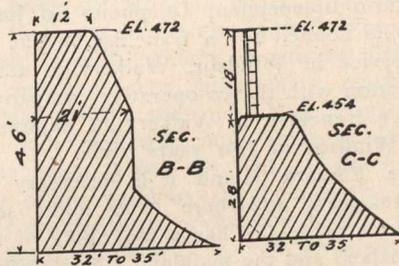
As the co-efficient of friction existing in the structure may possibly have been equal to .660, I will not say positively that the trouble lies here. As the stability moment of 28 millions exceeds the overturning moment of 22 millions, I cannot say that the trouble lies here. But one can quite readily see that the estimated pressure in each case is uncomfortably near to the estimated strength. The dotted line, shown on the elevation, represents the line of breakage, all of the wall above this line having been carried away.

It will be noticed that the break occurred at the part where the greatest height and greatest pressure existed. It may also be pointed out that where the break occurred is also where the greatest difficulty was encountered in depositing the material, a portion of it having been deposited, I am informed, in still water, about six feet in depth, recourse having been had to the open cylinder method of depositing concrete. It is well known that this is not the most desirable method, one great drawback being that small chance is afforded for inspection of the bed of the stream. The bed of the stream at this point is known to have contained a deposit of sand, and loose stones, and it is inconceivable that material should have been put in place without every vestige of such deposit having been removed. It was noticed that when the river was in flood, the water “boiled” at the foot of the dam, but later on this point of boiling occurred some distance down stream, and it is asserted that an opening had occurred through the foot of the dam, underneath one of the sections C-C. As this opening, and the pressure of the stream through it, increased, the point of “boiling” occurred farther down stream, until suddenly one of the piers, B-B, fell outward, and northward, and the whole section, as shown, followed.”

Another correspondent, who also visited the dam after the break, attributes the beginning of the trouble to the lack of cement in the concrete, and is of opinion that if the proportion of cement was put in, it was washed out by the running water, the current here being 10 to 15 miles per hour. He says a number of voids were visible in the concrete portion, and not more than half of these voids were filled up with mortar. As the break first occurred at the bottom, it was not a question of the “overturning moment. A fact to which the correspondent calls attention is that on one face of the section still standing a piece of one of the “forms” used in laying the concrete is to be seen, showing that the form had never been removed when the concreting was done, and that the presence of this form would prevent the bonding of the material—a possible cause in itself of the final break of the section.

It appears that the engineer who made the plans did not supervise the work of construction; and there seems to

have been little continuity of policy in the town council in dealing with the question, each councillor having his own plans, and most of them pulling at cross purposes. Three or four civil engineers were consulted, after the failure of the dam, and in the end the advice of none of them has been carried out. The construction of a tunnel through the rock at the gorge appeared to be favored as giving the surest ultimate results, but the first cost was a stumbling block to this plan. The council appears to have exercised little or no supervision while the work was being carried out, yet it spent \$2,000 on preliminary work for a dam proposed by a local man which a few weeks after was rejected for another plan.



Sections of Dam.

The matter has been settled for the present by a contract signed on the 17th August, between the Mayor and clerk, on behalf of the town, and Joseph Battle, of Thorold, Ont., who has agreed to construct a wooden dam for \$28,000 and have it ready by October 15th, 1904. Mr. Battle furnishes bonds of \$10,000, good for two years, as a guarantee of the work. A penalty of \$25 a day is to be paid if the work is not finished at the specified time.

Meantime, Peter Ryan, of Toronto, is trying to make a settlement of the Patriarche-Ryan suit against the town. It is hoped to clear up the whole business without another appeal to the courts.

RAILWAY NOTES.

The C.P.R. is re-tracking the main line from Toronto to London.

The Ottawa Car Co. is building five cars for New Glasgow, N.S.

The C.P.R. may buy the Berlin, Waterloo, Wellesley and Lake Huron Railway.

November 15th is the date set by Grand Trunk officials for the inauguration of the main line service through Brantford.

The Grand Trunk is building a freight shed, 30 by 150 feet, in Waterloo, and is adding seven sidings to the yard there.

The London Street Railway Co.'s car barns were destroyed by fire early in August. The loss is estimated approximately at \$25,000.

The C.P.R. is establishing divisional statistical offices to compile weekly reports instead of the present monthly record made at Montreal. Toronto and Montreal are the first two such offices.

The Privy Council has reversed the decision of the Court of Appeal, in the case of Toronto Railway Co. vs. Toronto. It is held that cars are personal property and unassessable.

The Grand Trunk is about to put up a \$60,000 round-house, in London, Ont. It will have 42 stalls and a turntable. Yarding facilities at London will probably be increased.

Traffic Manager Tiffin, of the Intercolonial, says a much better service will be put on the Canada-Eastern when it comes under Government control. The shops at Gibson will be retained.

A loaded freight train on the Quebec and Lake St. John Railway ran away, and was wrecked at Hedleyville, near Quebec. The loss to the company is estimated at \$40,000. No lives were lost.

A contract has been entered into between the Railway Department and Rhodes, Curry & Co., of Amherst, N.S., for the building of a new private railway car for the use of the Governor-General.

The Quebec and Lake St. John Railway directors are calling for tenders for the construction of thirty-eight miles of railway to connect the main line from Quebec with the St. Maurice line at La Tuque.

The first of the ten passenger locomotives which the Grand Trunk ordered from the Locomotive and Machine Company, of Montreal, Ltd., has been turned out. The locomotives are of the large ten-wheeled type.

The Intercolonial Railway has decided to build a new station at Sydney. It will be of stone and brick, and is to cost \$70,000. Tenders have been called for and the station is to be completed early next summer.

The Quebec Electric Company, in the course of a few days, will start work on the installation of its plant at St. Anne and Seven Falls. It is the intention to operate an electric railway from Ste. Anne de Beaupre to Murray Bay.

The contract for carrying the British-Australian mails, which has been held by the C.P.R., has passed to the New York Central, Lake Shore, Northwestern, and Union Pacific. Recent Lake Shore improvements in roadbed and equipment effect a saving of time, and are credited with helping to obtain the contract.

A new railway is to be built from Rouse's Point, N.Y., to St. Constant, P.Q., where it will connect with both Grand Trunk and Canadian Pacific, considerably shortening the distance from Montreal to Rouse's Point. The line will be constructed by a private company. G. D. Dunne, of Ottawa, is preparing plans.

The Caraque, N.B., Railway has been bought by Messrs. Peter Ryan and T. P. Coffee, of Toronto. It consists of eighty miles of track, running from Bathurst to Tracadie Mills, through a good, farming, fishing and lumbering country. The road was built about twenty years ago, and heretofore has been owned by the English bondholders.

The Grand Trunk Railway will shortly erect a series of new shops, at Stratford, at a cost of \$170,000. At this point eight hundred men are at present employed by the company, and it is expected that by the end of the year that number will be increased to one thousand. The buildings are to be erected and the machinery installed by December 15th.

S. T. Callaway has been appointed manager of the Locomotive and Machine Company, of Montreal, Limited, succeeding Roger Miller. Mr. Callaway, is a son of the late S. R. Callaway, president of the company. George Gurry, a practical locomotive builder of large experience, is superintendent of the works at Longue Pointe. The company is spending a large sum of money in equipping the plant for turning out a large number of locomotives, and in providing homes for the skilled workmen.

F. S. Darling, the Canadian Pacific Railway engineer in charge of construction work east of Winnipeg, makes the following statement regarding the proposed Toronto-Sudbury branch: The line will cost \$8,000,000, and of this amount \$2,000,000 will be required for the 58 miles from Romford to Byng Inlet. The grade of the centre route shall in no place be more than three-tenths of 1 per cent. There will not be any curve higher than 4 per cent. This will make it equal to any section on any line in Canada. A large number of men are now at work on the portion of the line between Romford and Byng Inlet, where the rocky nature of the country makes it cost over \$35,000 a mile. In addition, a large number of bridges will have to be constructed, the one at the French river alone to cost \$300,000. Regarding a port on the Georgian Bay, the best location for one would be at Byng Inlet, for, though it is situated four miles from the bay, there is a straight channel. As soon as the first portion of the line is completed, the contracts for the second portion will be awarded. Though the northern portion of the territory is a wilderness, it contains splendid lumber, while the remainder is through very fertile country.

Trenton passed a by-law to provide \$20,000 to purchase Ontario Electric Railway debentures.

Plans for the route of the Toronto and Hamilton Railway have been submitted to the railway department in Ottawa and approved.

Good progress is being made with the Canadian Northern extension from Carberry to Brandon. The line is within four miles of Brandon, which will be reached this month.

A special meeting of shareholders in the Tillsonburg, Lake Erie and Pacific Railway is to be held on September 20th to consider a proposal to lease the line to the C.P.R.

Two surveying parties are at work on the proposed Kootenay Central Railway, one surveying from Golden toward Fort Steele, and the other from Fort Steele to Golden.

Ten new passenger locomotives of the "900" class, and 20 new freight engines of the "800" compound type, are now in process of building at the G.T.R. Montreal shops, for service on the middle division. It is expected that the whole thirty will be in service before winter.

H. R. Charlton, chief of the advertising department of the Grand Trunk, has become an explorer. He, with J. W. Swan, official photographer, and W. E. Davis, son of the passenger traffic manager, made a voyage through Lake Temagami, Lady Evelyn Lake, Willow Lake, and a number of the tributary streams, returning to Temagami village by way of Montreal river and another chain of lakes. Mr. Charlton and his companions say the scenery of this region is entrancing, while the fishing is phenomenal. The new railway from North Bay to New Liskeard will be in operation next year, rendering this virgin territory easily accessible to the sportsman and tourist.

In about a month the Great Northern Railway will abandon 100 miles of its present main line in Montana in favor of a new route covering the same distance which strikes north from Columbia Falls to a junction with the Fernie, B.C., branch at Rexford, thence back again over the Fernie branch to the main line at Jennings. The existing main line will become a branch and fourteen prosperous main line towns will be cut off from the principal channel of the through business. By the abandonment of the 100-mile section, President J. J. Hill will secure a minimum grade for the Great Northern, which he claims to be slightly less than that of any of the American trans-continental routes. The new route will be used by all through trains of heavy tonnage, while lighter freights and local passenger trains will continue to use the old route, which will still be kept up.

TELEPHONE AND TELEGRAPH.

The Bell Telephone Co. has opened a system in Burford with twelve subscribers.

The telephone is being used instead of the telegraph for signalling and general purposes on the Temiskaming Railway.

The Newfoundland Government's wireless telegraph system, on Labrador, is now in operation. Stations are situated at Venison Island and Battle Harbor.

Kingston's offer to the Bell Telephone Company for phone rates of \$20 and \$25, instead of \$25 and \$30, and no bonus of \$700, has been refused by the company.

The International Telephone Co., composed of local men, has been formed at Fort Frances, Ont., and is at work putting in an independent telephone service for the town.

The Union Telephone Co., New Brunswick, has extended its system from Woodstock to Hawkshaw and Canterbury. The line is metallic circuit, equipped with Kellogg telephones.

A new telephone company, consisting of Canadian and American capitalists, is being formed in Buffalo. Specifications for installing a system in Toronto have been asked for by the promoters.

The Government has announced its intention of establishing Marconi stations at Pictou, N.S., and Charlottetown, P.E.I., and also to equip the Government steamers, Minto and Stanley, with Marconi apparatus.

A factory for the manufacture of all kinds of telephone supplies is to be erected in Windsor, Ont. The factory will employ over one hundred hands, and will supply the independent telephone companies of Canada.

The Marconi Wireless Telegraph Co. are now transmitting commercial messages to incoming and outgoing steamships from Fame Point, Heath Point, Point Amour and Belle Isle, at a toll of \$2 per ten words.

London city council has granted the Bell Telephone Company an exclusive three-year franchise, to date from 1st January last, at a yearly rental of \$2,500, being an increase of \$1,500 per annum over the expiring franchise; rates to remain as at present.

The Ontario Independent Telephone Co. has applied to the Walkerville council for a franchise. The company is seeking a service in Windsor, Walkerville and Sandwich, giving connection with the co-operative company in Detroit. The Bell Co.'s franchise, in Walkerville, expires in November, and in Windsor in two years' time.

In Prince Edward Island it is necessary to pay fifty cents for a telegram, and there is no night service. The Anglo-American Cable Co. has a monopoly of the business between the island and the mainland. Negotiations are now on between the Government and the Cable Co. looking to a reduction of tolls and improvement of service.

J. A. Carmichael, construction engineer of the Bell Telephone Company, is in Winnipeg, with plans for the proposed extension to the company's buildings in that city. The plans call for a \$50,000 building, which will enclose the old one on two sides, and will nearly treble the present office capacity. The top floor will contain a 20,000 multiple switch, now under construction.

The annual convention of the International Union of Architectural Ironworkers will be held in Toronto on September 19th. A number of questions important to the union will be discussed, and 225 delegates are expected to be present from all parts of the United States and Canada. One of the new propositions will likely be the adoption of the eight-hour day for Canadian workmen.

The Montreal Harbor Commissioners have rescinded their contract with the Canadian Inspection Co., for the inspection of steel to be used in the construction of new sheds. It is claimed that the contract was incomplete, and that the proposed inspection is more thorough than necessary, the Inspection Co.'s price being 62 cents per ton, whereas a shop test at 25 cents per ton is thought to be sufficient.

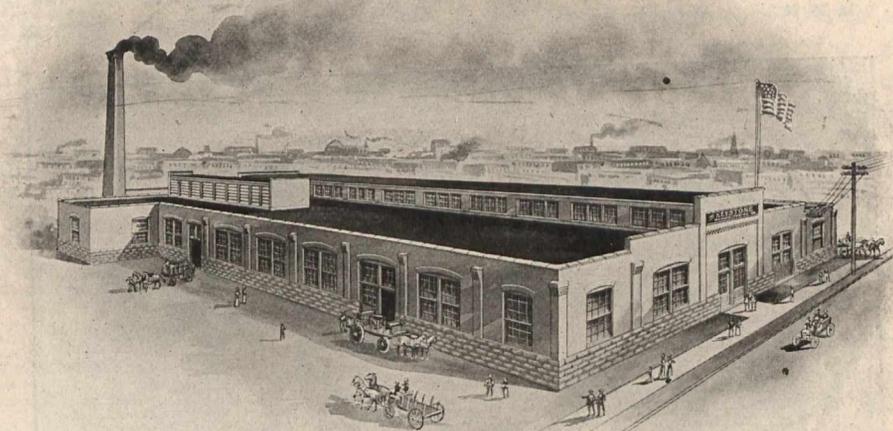
—The Chester Steel Castings Company, of Philadelphia, state that the recent fire at their plant was small and in no way curtailed the output, the fire being confined to one furnace and the building immediately over same. The damage done to the building is now being repaired by local builders. The company sustained no loss greater than the loss of the use of one furnace for a time, no damage being done to power and equipment, and two days after the fire the plant was in full operation and ready to handle any order in sight.

On the application of the Bank of Toronto, George Taylor, M.P., has been appointed liquidator for the business of the Canada Cabinet Co., of Gananoque. The company was incorporated in August, 1901, as the Morden Manufacturing Company. In 1902 it was reincorporated as the Canada Cabinet Co., with a capital of \$100,000. Of this \$78,000 has been subscribed, and \$58,800 paid up. The directors are: Samuel Carsley, F. W. Gross, R. Wilson Smith, Frank Summer, W. W. Williamson and R. J. Dale, all of Montreal; George F. Emery, of Gananoque. A local paper states that the business was a paying one, and financially sound if there had been harmonious action by those who controlled it. There is some expectation that it may pass into the hands of those who can continue it successfully.

THE KEYSTONE MANUFACTURING CO.

The accompanying cut shows the plant of the Keystone Manufacturing Co., makers of ratchet drills and Westcott adjustable "S" wrenches. The building is situated at 41 to 51 Chandler St., Buffalo. It is 80 by 138 feet with an L 18 x 18 feet, and is all of one story, 15 feet in height. It is on a lot 180 x 140 feet, leaving room for additional buildings when required.

The building is constructed of stone, brick, iron and steel, the roof being of expanded metal and concrete fire-proofing, the only wood used being in doors, windows, partitions and floor, the latter of which is of oak and maple, $3\frac{1}{4}$ inches thick, and resting on oak sleepers on solid ground, filled in with cinders, practically fire-proof. The plant is divided into seven departments—machine shop and tool-room, blacksmith's shop, polishing room, shipping and stock-room, boiler and coal-room, storage-room and offices. The machine shop is 60 x 138 feet, taking up the entire western side of the building. It contains the electric plant, composed of transformers, switchboard, etc., where current is received from Niagara Falls, and distributed for power



and lighting; also 68 special, automatic and other machines, all run by one 40 horse-power motor, suspended from the ceiling. The blacksmith shop is 20 x 48 feet, and is separated from the rest of the departments by brick walls. In it are the forges, annealing and tempering furnaces, and the stock of heavy raw materials used. The polishing room is 20 x 30 feet, and contains the grinding and polishing machinery, run by a 15 horse-power motor. The shipping and stock room is 20 x 30 feet, in which finished stock is kept, and from which shipments are made. The offices occupy 20 x 30 feet, and are conveniently and well fitted up. The entire plant is well lighted and ventilated throughout by large windows and a lantern running the entire length of the building, so that every foot of the interior is equally well lighted and ventilated. The heating system employed is what is termed the "over-head system," all the pipes and radiators being suspended from the ceiling, and out of the way. It is a comparatively new system, and worked very well in this plant during the trying winter past. The company now employ sixty-five men.

PROTECTION OF LIFE FROM HIGH-TENSION CURRENTS.

The death, on July 7th, of Percy Smith, a Grand Trunk fireman, as the result of grasping a live wire belonging to the Toronto Electric Light Co. brings into prominence the danger from wires carrying high tension currents. The verdict of the coroner's jury in this case, charging the company with culpable negligence, was a serious indictment. Another similar accident followed on August 19th, when

J. H. Fowler, a painter, was killed at the Hamilton Tool and Bridge Works by coming into contact with an unprotected wire carrying 2,200 volts as he was descending from a scaffold. While there is no need to minimize responsibility in these cases, such accidents should be impossible. In view of the rapid development of long distance power transmission it is very desirable that some legislation should be enacted which would compel electric light and power companies to provide against fatalities from electric shock.

In Great Britain, where there is an entire immunity from accidents of this nature, electric light and power companies are controlled by the Board of Trade, a Government department, and all work has to be carried out in accordance with the rules laid down by that body. The following are some of the more important rules, and we would point out that, had these regulations been in force in Toronto, the unfortunate victim of the Parkdale fatality would be alive to-day:

Rule 1.—"An aerial conductor in any street shall not in any part thereof be at a less height from the ground than twenty feet, or where it crosses a street thirty feet, or

within six feet of any building or erection other than a support for the conductor, except where brought into the building for the purpose of supply."

Rule 9.—"Every high-pressure aerial conductor must be continuously insulated with a durable and efficient material, to be approved by the Board of Trade, to a thickness of not less than one-tenth part of an inch, and in cases where the extreme difference of potential in the circuit exceeds 2,000 volts, the thickness of insulation must not be less in inches or parts of an inch than the number obtained by dividing the number expressing the volts by 20,000. This insulation must be further efficiently protected on the outside against injury or removal by abrasion."

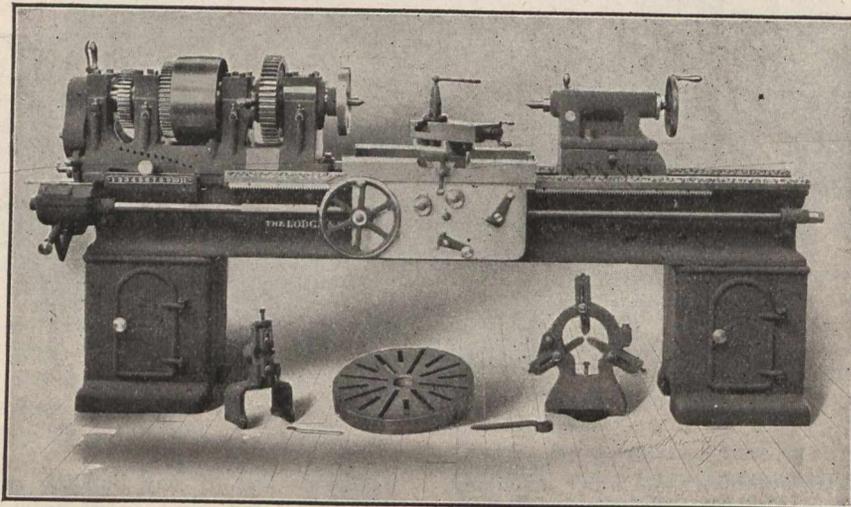
Rule 10.—"The material used for insulating any high-pressure aerial conductor must be such as will not be liable to injurious change of physical structure or condition when exposed to any temperature between the limits of 10° F. and 150° F., or to contact with the ordinary atmosphere of towns or manufacturing districts."

Rule 11.—"The insulation resistance of any circuit using high-pressure aerial conductors, including all devices for producing, consuming, or measuring energy, connected to such circuit shall be such that, should any part of the circuit be put to earth, the leakage current shall not exceed 1-25th of an ampere in the case of continuous currents, or 1-50th of an ampere in the case of alternating currents. Every such circuit containing high-pressure conductors shall be fitted with an indicating device, which shall continuously indicate if the insulation resistance of either conductor fall below the conditions required by this regulation."

Rule 12.—“Every aerial high-pressure conductor shall be efficiently suspended by means of non-metallic ligaments or suspending wires, so that the weight of the conductor does not product in it any sensible stress in the direction of its length, and the insulated conductors and suspending wires, where attached to supports, shall be in contact only with material of highly insulating quality, and shall be so attached and guarded that in case they break away it shall not be possible for them to fall away clear of the support.”

Rule 15.—“Every aerial conductor, including its supports, and all the structural and electrical appliances and devices belonging to or connected with such conductor shall be duly and efficiently supervised and maintained for or on behalf of the owners as regards both electrical and mechanical conditions.”

It will be seen that in the matter of regulations protecting life and property from the dangers of high-tension currents Great Britain is much more advanced than this Dominion, and, while it may be too much to expect that similar conditions could be obtained in the less populated districts of Canada, so far as the cities and towns are concerned, the adoption of some measures to render accidents from electric shocks impossible is most certainly an urgent necessity. The proper place for all wires in the larger cities and towns is underground, but failing that, no laws can be too stringent for the protection of human life.



NEW PATENT HEAD LATHE.

The lathe here represented is made by the Lodge & Shipley Machine Tool Co., Cincinnati, Ohio.

The aim in the design of the head has been to provide a lathe that will maintain its life and accuracy and stand the hard abuse that a machine of this class is subjected to with the use of high speed steels. The construction of the pulley and sleeve is such that there is no belt strain whatever on the spindle—this is taken care of by two bearings that support the pulley sleeve independent of the spindle bearings. The sleeve has a hole through its centre, which is one-eighth larger in diameter than the lathe spindle, so that there is no point of contact between the sleeve and spindle. By this means we are able to supply the necessary high speeds through our back gears without running the pulley on the spindle, thus eliminating nearly all friction. The regular engine lathe is short-lived and troublesome in this respect when using high speeds and impossible to oil. The end of the pulley sleeve has a positive clutch so that it can be engaged with one which slides on the inside hub of the face gear. This in turn is operated by a lever handy to the operator for engaging the spindle or the back gears. On the pulley sleeve are keyed two gears of different diameters into which either of a pair of sliding gears on the back gear shaft can be engaged. The ratios of these gears are 3 to 1 and 9 to 1. The pulley on the sleeve is of a large diameter and made to take a much wider belt than formerly used on

the standard cone pulley engine lathe. The spindle of the head is mounted in bearings, but passes through the pulley sleeve and does not fit, having one-eighth of an inch of clearance. From this it can be readily understood that when the head is at work there is no pull of the belt on the spindle. The belt pull is taken entirely by the bearings that support the pulley sleeve, as is also the pressure of the driving gears. This feature will add greatly to the life of the spindle bearings, and enable the spindle to maintain its perfect alignment many times longer than the old construction. The back gearing now revolves as one piece on its own journals, and in self-oiling bearings with a novel means of engaging and disengaging. This will be recognized at once as a much-desired improvement.

Oiling has been given a great deal of consideration, and it is stated that the oiling device will run at least three months at one oiling. The construction of this is such that it is impossible for any oil to get out of these bearings. Deep oil wells are cast in the centre of the bearings for the spindle and sleeve, and hold at least one pint of oil each. On the front of the head on each of these bearings is a lug which is bored out and a glass tube inserted in such a manner as to always show the level of the oil. Mounted on the spindle and sleeve and made to turn with them are brass rings with projections, on the principle of the “Bucket Pump,” that have holes bored in the projections, so that when spindles are turning, these dip the oil out of the wells, and as they pass over the centre of the spindle they drop

the oil onto the spindle, and continue to do this regardless of the speed at which the spindle revolves.

This is not a high-speed lathe only. It can be used to equal or better advantage on any class of work that has been done on the old type of cone pulley head engine lathe. None of the good qualities of an engine lathe are lost and many new good qualities are gained, notably about double the power.

The lathe is furnished with a countershaft giving the necessary speeds to operate, as above described, which is if anything simpler than the old style countershaft.

The details of the lathe, other than the head, are the same as those of the Quick Change Gear Lathe, made by the same company.

20 in. Lathe,
20 in. Lathe, with new
with usual patent
cone pulley. headstock.

Pressure exerted by belt on spindle bearings in lbs. per square inch of bearing surface.....	17.6	None.
Pressure exerted by belt on spindle between bearings which affects the alignment of the spindle	393 lbs.	None.



Construction of Sydney Mines (C.B.) waterworks is being commenced. D. Sutherland has the contract.