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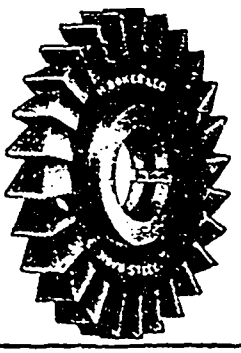

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CANADA'S INDUSTRIAL CENSUS.

In the proceedings of the May meeting of the executive council of the Canadian Manufacturers' Association, in the report of the Commercial Intelligence Committee it was stated that:

The Dominion Census Commissioner, Mr. Archibald Blue, had written to the association to say that he would be glad to have the benefit of the suggestions of the association in compiling the figures and tables of comparison for the Industrial Census of 1906; and that the secretary had been instructed to discuss the matter with Mr. Blue, and to find out the particular lines along which the association could be of assistance. Upon receipt of this information the committee would go into the matter very fully, so that the census report might be compiled in the manner best calculated to meet the requirements of manufacturers generally.

In the June 7 issue of THE CANADIAN MANUFACTURER was published a bulletin issued by the Census Department at Ottawa on June 5, which gave information showing the values of manufactured products of towns and cities in Canada, having a population of 1,500 and over in 1901, as shown by the government census taken in that year, and in 1906, for works employing five hands and over. The bulletin showed the values in all Canada in the years named, and also in each of the provinces, a foot-note showing that the amounts were incomplete in all Canada, and in Manitoba, Ontario, Quebec and "The Territories." On the face of the bulletin the figures show an incompleteness and unreliability that is most remarkable, and excites the inquiry why the Census Bureau, with the assistance of the Canadian Manufacturers' Association, if such assistance was rendered, should have issued the bulletin —why it was not delayed until it was completed. During the five years under discussion—1901-1906, the manufacturing industries of Canada have been increasing by leaps and bounds, and if the figures relating to 1901 are correct, and that the output of manufactured products in that year were valued at $481,055,575, the showing that the increase in 1906 was only to $712,664,835, does not do justice to the facts. In the bulletin the statistics of only 114 towns and cities in Ontario are given, while in fact we could mention 150 other towns and cities in the province that are not mentioned in which are hundreds of manufacturing establishments each with large invested capital and are large employers of labor; and what is true as regards Ontario is also applicable to certain extent to all the other provinces.

If the true and correct facts regarding the manufacturing industries of Canada were collected and published this country would be given much higher credit than what it now receives, and it is to be regretted that when Mr. Blue had requested the assistance of the Canadian Manufacturers' Association in collecting and compiling the figures and tables of comparison, nothing more should have been done by it to assist him in his important labors than what was done, which was absolutely nothing.

THE IRON AND STEEL BOUNTIES.

The Canadian government, with a view to the encouragement of the smelting of domestic iron ore by electricity and the manufacture of steel by electric process, has made special provision to the payment of bounties as follows:

Pig iron manufactured from ore, on the proportion from Canadian ore produced during the calendar years 1907, $2.10 per ton; 1908, $2.10; 1909, $1.70, and 1910, 90 cents.

Pig iron manufactured from ore, on the proportion from foreign ore produced during the calendar years 1907, $1.10 per ton; 1908, $1.10; 1909, 70 cents, and 1910, 40 cents.

On puddled iron bars manufactured from pig iron made in Canada during the calendar years, 1907, $1.65 per ton; 1908, $1.65; 1909, $1.05, and 1910, 60 cents.

Rolled round wire rods not over three-eighths of an inch in diameter, manufactured in Canada from steel produced in Canada from ingredients of which not less than 50 per cent. of the weight thereof consists of pig iron made in Canada, when sold to wire manufacturers for use or when used in making wire in their own factories in Canada, on such wire rods made after December 31, 1906, $6 per ton; steel manufactured from ingredients of which not less than 50 per cent. of the weight thereof consists of pig iron made in Canada, on such ingots made during the calendar years 1907, $1.65 per ton; 1908, $1.65; 1909, $1.05, and 1910, 60 cents. No bounty shall be paid on iron or steel made in Canada by the electric process after December 31, 1908.

On pig iron and steel manufactured in Canada, for consumption therein, when such pig iron and steel is the product of Canadian iron ores smelted in Canada by

electricity, viz., on pig iron manufactured from Canadian ore by the process of electricity smelting during the calendar years, 1909, $2.10 per ton; 1910, $2.10; 1911, $1.70, and 1912, 90 cents.

On steel manufactured by electric process direct from Canadian ore, and on steel ingots manufactured by electric process from pig iron smelted in Canada by electricity from Canadian ore during the calendar years 1909, $1.65 per ton; 1910, $1.65; 1911, $1.05, and 1912, 60 cents.

The bounty, as on pig iron, may be paid upon the molten iron from the ore which in the electric furnace enters into the manufacture of steel by the direct process, the weight of such iron to be ascertained from the weight of the steel so manufactured, but the bounty shall not be paid on steel ingots from which steel blooms and billets for exportation from Canada are manufactured.

CANADIAN RAILWAY BUILDING.

For the past ten years Canada has been steadily outgrowing her railway facilities. The expansion of the settled area of the West has during that time, but particularly in the more recent years, been much more rapid than even the wildest dreams of a few years ago ventured to picture. It is no wonder, therefore, that the Dominion finds herself compelled to make the greatest possible efforts to provide transportation facilities which shall cope with this rapid expansion and with her speedily growing production, which is now all too great for available railroads. During the past winter existing roads have been able to handle but a part of the business at their command, and the country has suffered accordingly.

Last year established a record in Canada's railroad building, but the work to be done in 1907 is still vaster. Existing roads have to make extensions in all directions, and the urgent need for new roads demands that no time be wasted in the laying of rails. Work upon the new transcontinental railroad, the Grand Trunk Pacific, is being pushed apace at a dozen different points, but it will take another five years to complete it. The Canadian Northern and the Great Northern are both making their way east and west through a country that is now more or less populated.

Perhaps the greatest difficulty encountered in this work of railway expansion is found in the securing of sufficient labor to carry on the projected work. It is natural that labor of all kinds should be scarce in a new country which is enjoying a period of great prosperity. This is the case in Canada. Something like 6,000 miles of railway will be laid down during the coming season, and about 60,000 men will be required to do the work. Newspaper reports which emanated from the West have said that it was intended to lay 60,000 miles of rail—a small matter of thirteen new transcontinental roads. These reports were absurdly exaggerated. The "sixty thousand" very evidently referred to the number of men needed to do the work in hand. The 6,000 miles of railroad to be laid this year includes extensions to existing systems and double-tracking, which is very rapidly being accomplished in the older portions of the country.

Considerable difficulty was experienced last year in getting sufficient men to do the work in hand, and it was reasonable to expect that with still more work to be done during the season of 1907, the difficulty of securing labor would be greater than ever. The government, however, is taking up the matter, and every effort is being made to bring into the country a class of immigrants who will be suitable for this work. Last year the total immigration amounted to 250,000, of which a fair percentage were men who would be likely to join the construction camps. The government states that this year it will have no difficulty in attracting 300,000 people, and there is every reason to expect that, this being the case, the work of railway construction will go forward pretty much as arranged. It may be that in the extreme west Asiatic labor will play a large part in the accomplishment of this work.

As now mapped out, the Great Northern Railway hopes to lay down 1,000 miles of road this year, the Canadian Northern 1,500, the Canadian Pacific 1,500 and the Grand Trunk Pacific, 1,900. At this rate the roads will use a greater quantity of steel rails than Canada is yet able to produce.

NO CHAMPION OF THE POOR.

It is easily demonstrated that the Toronto Globe is no particular friend to either the poor man in Great Britain or the working man in Canada, and that it prefers to cast its influence more in the interest of the wealthy and aristocratic classes in the Mother Country than in the best interests of this Dominion. It weeps bucketsful of crocodile tears over the woes of the immigrants who are fleeing from Britain by thousands, and it knows why they are being driven from the country of their birth—the land of their birth, but in which they had no home, but it utters no word of protest against the causes that drive them away, and it does all it can to reduce the working classes of Canada to a similar condition. It is an ardent admirer of Cobdenism and free trade, and it holds up to scorn every nation and every people, and every individual who differs from it. The Globe is not a champion of the poor. Does it really know or care what the conditions of the poor are in Great Britain?

In a recent issue of Onward, one of the periodicals published in Toronto by the Methodist Book and Publishing House, of which Rev. Dr. W. H. Withrow is editor, is a sketch of the life of Joseph Arch, M.P., written by Rev. W. H. Adams, who calls Mr. Arch "the Champion of the Poor." He was once the guest for a week and visited at Sandringham, by special invitation of King Edward, who was then Prince of Wales. In a foot note to the Onward article Dr. Withrow says:

"It is a striking illustration of the new democracy of England that this man, Joseph Arch, brought up as a farm laborer, should represent in the great county of the nation some of the most ancient families of the realm; that, as Mr. Adams points out, the Prince of Wales and the ancient house of Warwick, the Kingmaker, are among the constituents of this sturdy Radical. More than that, the Countess of Warwick, one of

the most accomplished and beautiful women in England, has written a thoroughly sympathetic introduction to Mr. Arch's remarkable autobiography.

We do not think that the Globe will call in question the respectability and truthfulness of either Onward, Dr. Withrow, Rev. Mr. Adams, or even Joseph Arch, M.P., and we here quote from the article:

Speaking of the autobiography, Mr. Adams says:

"I have said the volume is a revelation. That statement may need modifying, since some of its readers may have been able to properly interpret Kingsley's "Yeast," or may have been personally familiar with the conditions of life in rural England a few decades ago. But for those of us who have grown up with the present generation, or who have been disposed to deem Kingsley's novel somewhat overwrought, it is a horrible surprise. That the lot of the agricultural laborer could in this, "The Wonderful," century, have really been so hard and hopeless as is here described, shocks all one's sensibilities. That England, which was the self-sacrificing friend of the negro, and the uncompromising foe of those who kept him in bondage, should yet have held some of her own sons in a hideous and inhuman slavery, passes comprehension. But the bald, bare facts are here thrust right upon us; and we see the nation, like the idiotic Mrs. Jellyby, exulting over the inhabitants of Borioboola Gha, while it is as blind as a bat to the nakedness and hunger of those who throng its own hearthstone.

He slaved at farmwork from four a.m. to ten p.m., and often longer, and frequently not more than twopenny worth of victuals would pass his lips the long day through. Slave as he might, his tyrannical employer was never satisfied. Wages would run in those parts from six to seven shillings a week, and stop at eight or nine shillings. There were old men whose wages did not go beyond a miserable five shillings, and when they had paid one shilling and sixpence out of that for rent, they made a close acquaintance with half-starvation. . . The ordinary breakfast would be tea-kettle broth—that is, bread in the breakfast pot with hot water poured on it; for dinner there would be a few potatoes, some bread, and occasionally a bit of bacon, but the bacon was most often seen on the father's plate while the rest had to feed on the smell of it; then for supper bread again, and perhaps a small bit of cheese. Here was high living for a working man. The cottage accommodation was a disgrace to civilization; and this not only in Somersetshire, but all over the country. As many as thirteen people would sleep all huddled up together in one small cottage bedroom.

"The cottage loaf was mostly of barley . . . In the country districts, generally, potatoes were exceedingly scarce. In our own neighborhood there were none to speak of; only one man near us grew them, and he hoarded them up. With corn at a prohibitive price, with fresh meat hardly ever within reach, with what potatoes there were hoarded up and not for the buying, what in the name of necessity were the people to do. They could not grow potatoes, they had no allotments, and the bulk of the laborers had no gardens.

"Well, these people—people, mind you, who were clearing and planting and tilling the land, who were putting their very lives into it—in order to keep body and soul together were driven to steal the food they could not get for love or money. Yes, would-be honest Englishmen were forced to become common thieves. They stole turnips from the fields, potatoes when they could get them, and any other edible thing they could lay hands on. You see they were ravenous, they were starving. I have no doubt that if our Warwickshire earth had been eatable, some of these poor sons of the soil, like the Andaman Islanders, would have tried to nourish themselves on it, so hard pressed were they. They were rendered so desperate through hunger that they defied the law and its terrors every day.

"As they were unable to procure fresh meat honestly, they stole that as well. Poaching became so prevalent that it is hardly an exaggeration to say that every other man you met was a poacher. It is my deliberate opinion that these men were to some extent justified in their actions. They had by hook or by crook to obtain food somewhere, in order to enable themselves, their wives, and their children to live at all, to keep the breath in their bodies. Necessity knows no law but its own. I have always been one for keeping the laws of the land and upholding them as far as possible; but how can I blame these men because they would not sit still and let the life be starved out of them and theirs? They would not; so they risked their liberty, the next dearest thing they had—though it was a poor enough liberty at the best—in their endeavors to obtain food. The horrors of those times are clearly and vividly before my mind's eye even now. It is as if they had been burned and branded into me. I cannot forget them."

The foregoing extracts, taken here and there at random, indicate as far as the limits of this article will allow what an appalling picture of abject poverty and wretchedness is painted for us in the volume in question. The thought of it fairly makes one heart-sick. But the poor laborers were placed under a pettifogging espionage which added to their ill. By the provisions of the iniquitous Game Laws they might be assailed and searched by an officer at any hour; and atrocious injustice was often added to this hateful indignity. We are furnished with a case or two in point:

"There was a man arrested in 1866, within 40 yards of his own house. He had got two or three sticks which he had picked up in the road going along. They had been blown out of the hedge and lay on the highway, so he put them in his inside pocket, for they were only bits. A policeman jumped out on him and caught him by the collar and said, 'I have a strong suspicion that you have game.' The man said, 'I haven't.'

"'What have you in your pocket then?' said the policeman.

"'You can soon see what I have got,' answered the man, and he showed his inside pocket in which were the few sticks.

"The policeman then said, 'You must come along with me; I must lock you up,'

"It had been the custom in our neighborhood, ever since I was a boy, that if a woman was cleaning turnips in a field she might take two or three, once or twice a week. Farmers did not object, as a rule, and I have often seen women when turnip-cleaning put some into their aprons before their employer's face; it was an understood thing. Farmers have made such offers to me, and of course I have taken them. I no more thought of refusing them than I would have thought of not putting my week's wages in my pocket. After the Act came into operation the police set upon two women in my village—respectable, honest, married women—searched them, brought them before the magistrates at Warwick, and charged them with stealing turnips. The police prosecuted and gave evidence, and the women were fined. It was a very great shame, and the village people were very bitter and sore about it. If tidy, decent, hard-working mothers of families were not safe, who could be? . .

"I saw a man who was made to pay £1 9s. 6d. because he was getting some liverwort for his sick wife. He went into the wood where it grew; it grows by the sides

of dykes in woods, and I have often got some of it myself, and other herbs which are very essential to the health of a growing family. I have always used them for mine for years. No doubt the man should have asked leave, I grant that, but I dare say he never thought about it; he only thought of the liverwort. He went just inside the gate, and was picking the herb, when up marches the keeper, apprehends him, and summons him for trespass in pursuit of game. On that charge the man was tried, and he had the option of paying, or going to prison for twenty-one days. . . . Why, I have been watched by a gamekeeper myself; regularly stalked I have been. After draining or hedge-cutting, when I have finished my work at night, he has gone right along my work and beyond, to see if I had put any game or traps there, and he has looked into every hole to see if I had committed myself. The keepers, as a rule, were men who wanted to get up cases, and they did not care where they got them from. That keeper, if he had put a hare in one of those holes beyond where I had not cut, and I had gone the next morning and begun my day's work and had unfortunately picked it up—although I had never put a wire there,he might have watched and come down on me and prosecuted. Keepers have been known to play such dastardly tricks on laborers."

The utter misery of the laborer's life was accentuated by the very efforts of those people who sought, in some places, to mitigate it. For the cast-off clothes, and the slops from soup-kitchens, which they occasionally dispensed to these poor pariahs, only served to extinguish what little spirit might be left,—since, by receiving these wretched doles, they proclaimed themselves parasites and paupers. What was wanted was not this dilettante tinkering; but a statesmanlike and philanthropic effort which would end in their emancipation. Hodge and his interests, though, were not objects on which the philanthropist or statesman bestowed much thought. Those gentlemen had other fish to fry. At length, however, through the black Egyptian night, a great despairing cry went up to heaven from these crushed souls, asking for some Moses to deliver them. God heard the prayer, and raised up Joseph Arch.

EDITORIAL NOTES.

The British Board of Trade returns furnish an interesting comparison of the amount of weekly wages paid to agricultural laborers in England, Scotland, Wales, and Ireland. It appears that in England the highest average wage is $5.32, paid in Durham, and the lowest $3.48, in Oxfordshire; in Wales the highest is $5.10, in Glamorgan, and the lowest $3.76, in Cardigan; in Scotland the highest is $5.32, in Renfrew, and the lowest $3.26, in Shetland, Orkney, and Caithness, while in Ireland the highest is $3.12, in Down, and the lowest $2.10, in Mayo. The highest wage in Ireland is 14 cents lower than the lowest in Scotland, 36 cents lower than the lowest in England, and no less than 64 cents lower than the lowest in Wales.

The scarcity of horses and men in the West is one of the most noticeable features in the progress of industry, says a St. Paul dispatch to the Boston Transcript. Good draft horses, which eight years ago were worth only $40, are now selling at $200 to $300 each; a good team is worth $500. These horses are needed in the lumber woods and on railway construction, but not enough can be had. Men to work in the woods are being paid $70 a month and board. A man with a good team commands wages of $9 a day hauling lumber and logs. Never have the wages been so high or the prices of horses so great as now.

New York's new child-labor law provides that no minor under 16 years of age shall be employed or permitted to work in any factory in the State before 8 a.m. or after 5 p.m. The new law goes into effect January 1, 1908.

The imports of lead into Great Britain declined from 229,500 tons in 1905 to 208,200 tons in 1906, while the exports for the year fell from 60,500 tons to 58,400 tons. The consumption of lead in Great Britain showed a decrease in 1906 of over 25,000 tons compared with 1905.

The London Commercial Intelligence states that Sir Howard Vincent's merchandise marks act (amendment) bill has gone through the grand committee of Parliament and will probably become law, upon which it comments:

"Under the old act the famous 'Made-in-Germany' label became in practice a magnificent advertisement for our rivals, and the act had the very opposite effect to that intended by its authors. The operative clause of the measure now reads:

"'All goods of foreign manufacture bearing any name or trade mark being or purporting to be the name or trademark of any manufacturer, dealer, or trader in the United Kingdom, which by section 16 of the merchandise marks act, 1887, are prohibited to be imported into the United Kingdom unless such name or trade mark is accompanied by a definite indication of the country in which the goods were made or produced, shall be so prohibited from being imported unless such name or trade mark is accompanied by the words, 'Made abroad,' and accordingly in sub-section 1 of the said section for the words 'is accompanied by a definite indication of the country in which the goods were made or produced' there shall be substituted the words 'is accompanied by the words 'Made abroad,'' and those words shall be deemed to be a trade description within section 3 of the said act.

On another page is an article from THE CANADIAN MANUFACTURER on the new postal arrangements. THE MANUFACTURER calls the convention with Great Britain "intellectual tomfoolery," and it is that indeed. To pay $30,000 to carry British periodicals to Canada, which our people don't want and to put up bars against periodicals they do want, is "tomfoolery" and downright giving away of the people's money. But read the article referred to and form your own conclusions. —New Glasgow, N.S., Eastern Chronicle.

A recent report issued by the Department of Trade and Commerce of the Dominion of Canada shows that during the twelve months ending March 31, 1907, (which is the date at which the fiscal year now ends), exports from Canada to the United States increased by $20,145,508, or 22½ per cent., while the exports to Great Britain increased by $8,930,931, or 7 per cent., as compared with the preceding twelve months. On the other hand imports from Great Britain increased by $16,089,287, or 24 per cent., while imports from the United States increased by $39,791,452, or 23½ per cent. During th

twelve months the total exports from Canada amounted to $272,206,606, an increase of $32,082,960, or 13½ per cent. The total imports were $340,374,745, an increase of $60,046,035, or 22½ per cent. The total trade for the twelve months was $612,581,351, an increase of $92,123,995.

The revenues of the United Kingdom for the financial year, ending on March 30, 1907, amounted to $753,477,186, which was derived from the following sources: Customs, $160,099,800; excise, $147,501,000; estates, $69,984,000; stamps, $38,637,000; land tax, $3.450,600; house duty, $9,185,400; property and incomes, $153,576,000; post-office, $83,446,200; telegraph service, $20,679,300; crown lands, $2,527,200; receipts from Suez Canal shares and sundry loans, $5,336,173; miscellaneous, $9,433,722. The expenditures during the year were approximately $679,000,000. It is noteworthy that the decline in customs amounts to $7,500,000 for the year, and the decrease in stamp duty is nearly $1,215,000. The value of dutiable goods entered for consumption in Canada in 1906 was $176,790,332, upon which $46,671,101 duties were paid.

Following is the purport of a conversation said to have occurred between The Globe, and an immigrant recently arrived from England. The immigrant was an intelligent mechanic, who was unable to get work at home where there was plenty of free trade and no work, and had come to Canada where there is plenty of work and free trade wind is at a discount. The immigrant tells of the interview:

"Free trade 'ud save fer you," sez he, "on food, an' cloe's an' rent."
Sez I, "Meat's dear 't a cent a pound 'if ye haven't got no cent.
Free trade it robs yer wallet an' steals yer meat an' corn,
An' offers ye big bargain sales, w'en all yer money's gone."

I ast him, "Wouldn't a pauper find it purty middlin' hard
To be a dude with touserin's at thirteen cents a yard?
We'd wear di'mon' studs fer buttons if they sol' 'em fer a nickel,
But if we had no money we'd be in the same ol' pickle."

"Free trade will usher in," sez he, "the gran' mellenial age
Foretol' by seers an' prophets ez the worl's gret heritage."
"Oh, w'en the big mellenium comes 'twill be all right," sez I,
"W'en our rivers flow 'ith honey an' our shade trees bloom 'ith pie;

W'en the angels drop down manna from the bendin' firmerment,
An' we hol' our han's an' take it an' don't have to pay a cent;
W'en food drops in our open jaws w'ile loafin' in the shade,
W'y then 'twill be a bully time to interduce free trade."

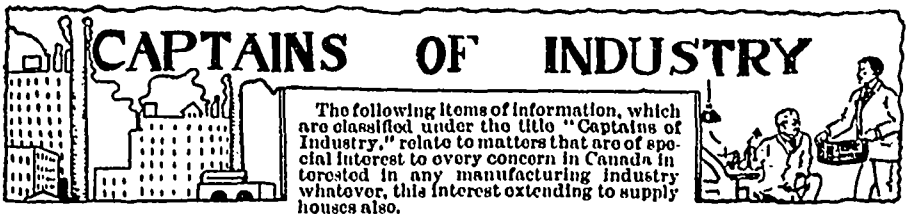
At a recent cabinet meeting in Ottawa Mr. A. P. Low, director and deputy head of the Geological Survey, was appointed Deputy Minister of the new Department of Mines. Dr. Haanel, Superintendent of Mines, was appointed director of the mines branch, and Mr. John Marshall, accountant of the Geological Survey, was appointed accountant of the new department.

There are to-day in the United States some 6,500,000 Irish of the first and second generation, in addition to the millions of more remote Irish ancestry, as compared to the 4,500,000 inhabitants still credited to Ireland; and the yearly remittances from the United States to Erin through the post-office amount, according to an estimate in the London Statist, to $4,000,000. Question? Why do the Irish leave Ireland when free trade is in full force and effect, and flock to the United States, that benighted country where protection prevails? Will The Globe answer? There are more Irishmen in the United States than in Ireland.

A bulletin issued by the Census Bureau at Washington places the total consumption of wood pulp in the United States for the year 1906 at 3,646,693 cords, as compared with 3,192,123 cords consumed in 1905. More than half of the pulp was made from spruce, and of the spruce pulp 721,322 cords were imported. This shows the value of a raw material going from Canada, when it ought to be manufactured into paper, to a foreign country to give occupation to foreign labor. An export duty would change the matter. It would mean more paper mills in Canada and more employment for Canadian labor.

According to a report issued by the International Federation of Textile Workers, at Manchester, England, the weekly wages of English operatives are: Weavers, $4.86; spinners, $9.72; card-room workers, males, $7.29, and females, $5.35; beamers, $7.29; bleachers, males, $8.76, and females, $4.37; and loom fixers, $10.20. In Holland the wages per week are given as follows: Spinners, $4.86 to $7.08; card-room workers, $3.12 to $4.37, and weavers, $2.40 to $4.05. In Denmark the average rates are: Spinners, $4.86, and weavers, $3.89 to $4.37. Weavers in Flanders running four looms earn from $2.04 to $2.88. In Silesia men weavers make $2.28 and women $1.68 a week. Referring to upper Franconia, the report states that "the manner of living of the textile workers corresponds to their low wages—plain, scanty, and often insufficient food. Their principal nourishment consists of coffee and bread, herrings and potatoes; meat rarely appears on their table." These facts are commended to the consideration of The Toronto Globe and to Canadian textile workers. The Globe desires free trade for Canada, which would bring the wages of Canadian textile workers down to the level of those above quoted.

Consul G. A. Bucklin, of Glauchau, reports that according to the latest statistics the population of the German Empire is given at 60,605,183. The average density of population is 290.3 per square mile. Saxony, with 5,789 square miles, has a population of 4,502,350, or an average of 778.9 per square mile. The Chemnitz division of Saxony contains 1,064 persons to the square mile, and is one of the most densely populated districts in the world.



The S. W. & A. Street Railway Co., Windsor, Ont., have decided to establish a power house on property adjoining the plant of the Canadian Salt Co., and use exhaust steam from the salt works. The new power house is not intended to replace the present one, but is being built as an auxiliary, to provide more power required by the operation of the Windsor & Tecumseh line.

The saw mill of Messrs. Kennedy & Davis, Lindsay, Ont., was destroyed by fire June 3.

The Toronto Electric Light Co., Toronto, have obtained permission to increase their capital from $3,000,000 to $4,000,000.

Port Arthur, Ont., has agreed to procure its water supply from Sarnia, Ont., and will lay its own mains.

Representatives of the Hawes-Vongol Hat Mfg. Co., of New York, and Danbury, Conn., are looking for a site in Brantford, Ont., on which to erect a factory.

The premises of St. John's Anglican Church, Madoc, Ont., were destroyed by fire recently.

The grist and saw mills of Fred. C. Barrett, Adelaide, near Strathroy, Ont., were destroyed by fire a short time ago. Loss about $8,000.

A gymnasium will be erected in connection with the armouries, Windsor, Ont., at a cost of about $6,000.

At the special meeting of the Fort William Ont., council, by-laws were put on their passage to raise $94,000 for the extension of the telephones, electric light and water systems, divided as follows:—Telephone, $36,000; water, $32,000, light, $26,000. By-laws were also passed to raise $68,000 to purchase lands for industrial purposes; $18,000 for a fire hall at West Fort; $2,000 for land for a site for the Imperial Steel & Wire Co., and $3,750 for land to extend the Central fire hall, an aggregate of $185,750.

The saw mill of E. Jull, Norwich, Ont., was destroyed by fire recently. Loss about $2,000.

The ratepayers of Campbellford, Ont., voted favorably on a by-law to loan $15,000 to Messrs. Jas. and Geo. T. Dickson, to aid them in establishing a bridge works factory.

The Grand Trunk Railway Co. will build a subway at Port Hope, Ont.

The new mill of the Lake of the Woods Milling Co., Keewatin, Ont., will shortly be in operation. It cost $1,250,000.

The new plant of the Canadian Ramapo Iron Works, Niagara Falls, Ont., will be in operation shortly.

The Concrete Pole Co., St. Catharines, Ont., have been awarded the contract for the supply and erection of 100 concrete poles in the city of Windsor, Ont., for the Windsor, Essex & Lake Shore Railway Co.

Penetanguishene, Collingwood and Midland, Ont., have applied to the Power Commission for permission to develop power at Big Chute, on the Severn River, for municipal purposes.

The Hamilton Printing Co., Hamilton, Ont., have been incorporated with a capital of $40,000, to carry on a printing and engraving business. The provisional directors include M. W. Parker, J. P. Garvey and P. Davis, Hamilton, Ont.

Messrs. Menzies & Co., Toronto, have been incorporated with a capital of $40,000, to manufacture stationery, books, pictures, office furniture, etc. The provisional directors include T. H. Menzies, W. H. Mara, and E. G. Long, Toronto.

The Beaver Superior Silver Mines, Toronto, have been incorporated with a capital of $3,000,000, to carry on a mining, milling and reduction business. The provisional directors include J. F. Hollis, W. R. Bird and M. E. Walker, Toronto.

Messrs. Getty & Scott, Galt, Ont., have been incorporated with a capital of $100,000, to manufacture boots, shoes, rubbers, gutta percha goods, leather, etc. The provisional directors include F. S. Scott, E. J. Getty and F. A. Scott, Galt, Ont.

D. Conroy, Peterborough, Ont., has been awarded the contract for the construction of the new bridge and dam at Buckhorn, Ont., at a cost of about $56,000.

The Board of Control, Toronto, invite tenders up to July 16 for the supply and erection of steel railway bridges for the Lansdowne Avenue subway.

The County Clerk, Teeswater, Ont., is calling for tenders for the construction of a steel bridge over the Saugeen River. The bridge will have two 100 foot and one 70 foot span.

The Commissioners of the Transcontinental Railway to Ottawa, invite tenders up to June 25 for 65,371 gross tons of 80 pound steel rails and the necessary fastenings.

The Windsor Dredging Co., Windsor, Ont., have been awarded the contract for dredging Toronto harbor, for which purpose the Dominion government have appropriated $50,000, to be expended on the work this year.

The Water Works Committee, Ottawa, have decided to purchase a duplicate set of pumps, at a cost of about $35,000. These pumps will give the city a capacity of 28,000,000 gallons per day.

A by-law will be submitted to the ratepayers of Ingersoll, Ont., for the taking over of the $95,000 waterworks plant of the town.

The ratepayers of Midland, Ont., voted favorably on two by-laws, one granting a fixed rate of $40,000 per annum for 20 years to the Canadian Iron & Furnace Co., and the other granting $5,000 for 10 years to the Midland Machine Co.

The city council, Toronto, have decided to erect a crib work along the lake front opposite the exhibition grounds at a cost of about $45,700.

The Renfrew Power Co., Renfrew, Ont., have just completed an extension to their plant, at a cost of about $30,000. This brings the capacity up to 1,000 h.p.

A bridge may be erected at Sunnyside, Toronto, at a cost of about $75,000.

Ideal Oak Leather Co., Toronto, have been incorporated with a capital of $50,000, to manufacture leather, etc. The provisional directors include H. E. Pearce, A. Gate and W. H. Smith, Toronto.

Montreal River International Silver Mines, Toronto, have been incorporated with a capital of $1,000,000, to carry on a mining, milling and reduction business. The provisional directors include J. B. Holden, N. J. Lander, and G. E. Hewson, Toronto.

The Munroe Prospecting & Developing Co., Cobalt, Ont., have been incorporated with a capital of $200,000. The provisional directors include C. F. Mitchell, W. R. Graham and J. I. Deadman, Cobalt, Ont.,

The Colonial Whitewear Co., Guelph, Ont., have been incorporated with a capital of $40,000, to manufacture whitewear, garments, etc. The provisional directors include E. H. Chart, Toronto, A. C. Renshaw, Berlin, Ont., and R. B. Bryson, Perth, Ont.

The Cobalt Combine Silver Mines, Toronto, have been incorporated with a capital of $1,000,000, to carry on a mining, milling and reduction business. The provisional directors include H. D. McCormick, F. A. Lewis and D. A. Rose, Toronto.

The Wellington Preserving Co., Picton, Ont., have been incorporated with a capital of $40,000, to carry on a preserving and canning business. The provisional directors include J. F. Beringer, T. E. Owens, Picton, Ont., and E. A. Pearce, Bloomfield, Ont.

The Georgian Bay Trap Rock Co., Windsor, Ont., have been incorporated with a capital of $40,000, to manufacture stone, etc. The provisional directors include C. W. Cadwell, Windsor, Ont., B. F. Comfort, and J. M. Young, Detroit, Mich.

The Canadian Pharmacal Co., Toronto, have been incorporated with a capital of $100,000, to manufacture drugs, chemicals, etc. The provisional directors include T. M. Higgins, B. Place, and W. Douglas, Toronto.

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

The Church of the Sacred Heart, Ottawa, was destroyed by fire June 10. Loss about $180,000.

David Clements, Ayton, Ont., has purchased the Jackson Wagon Works, Galt, Ont., and will establish a sawmill there.

A new High School may be erected at Haileybury, Ont.

The Temiscaming and Northern Ontario Railway Commission have awarded to the O'Boyle Bros. Construction Co., North Bay, Ont., the contract for the railway stores building to be erected in that place at a cost of about $20,000.

The McDowall Block and several adjoining buildings, Almonte, Ont., were destroyed by fire June 13.

The City Gas Co., Oshawa, Ont., have been incorporated with a capital of $40,000,

to manufacture gas, gas fittings, etc. The provisional directors include W. C. Noxon, W. C. Brent and C. H. Burgess, Toronto.

The Chaudiere Lumber Co., Ottawa, have been incorporated with a capital of $50,000, to manufacture lumber, timber, wood pulp, etc. The provisional directors include W. H. McAuliffe, A. M. Davis, and M. J. Gorman, Ottawa.

The New Ontario Bottling Works, Sudbury, Ont., have been incorporated with a capital of $10,000, to manufacture carbonated waters, etc. The provisional directors include W. A. Wilson, J. H. Clary, and G. E. Buchanan, Sudbury, Ont.

The Coleman-Bucke Silver Mining Co., Ottawa, have been incorporated with a capital of $1,000,000, to carry on a mining, milling and reduction business. The provisional directors include F. X. Plaunt, J. I. MacCracken, and W. Lennon, Ottawa.

The J. F. Hartz Co., Toronto, have been incorporated with a capital of $150,000, to manufacture chemical, medical, surgical and scientific merchandise, etc. The provisional directors include J. F. Hartz, Detroit, Mich., T. B. James, and R. W. Campbell, Toronto.

The Prospect Developing and Mining Co., Cobalt, Ont., have been incorporated with a capital of $1,000,000, to carry on a mining, milling and reduction business. The provisional directors include J. O. Brown, O. Baker and N. Logan, Cobalt, Ont.

Canadian Bessemer Ores, Limited, Toronto, have been incorporated with a capital of $100,000, to carry on a mining, milling, and reduction business. The provisional directors include T. Taylor, W. Gilchrist and A. F. Aylesworth, Toronto.

The Searchlight Larder Lake Mines, New Liskeard, Ont., have been incorporated with a capital of $3,000,000, to carry on a mining, milling and reduction business. The provisional directors include W. C. Sharp, M. F. Pumaville and R. McKay, Toronto.

The Cody Mfg. Co., Sarnia, Ont., have been incorporated with a capital of $50,000, to manufacture iron, brass, copper, gas and electric fixtures, etc. The provisional directors include A. S. Cody, R. D. Cody, Sarnia, Ont., and F. C. Kenny, Port Huron, Mich.

The Tilbury Town Gas Co., Chatham, Ont., have been incorporated with a capital of $40,000, to manufacture oil, gas, etc., and to carry on a mining, milling and reduction business. The provisional directors include R. E. Kizer, G. W. Holmes, Chatham, Ont., and J. A. Tremblay, Tilbury, Ont.

Consolidated Press, Limited, Toronto, have been incorporated with a capital of $250,000, to carry on a printing and publishing business. The provisional directors include W. R. P. Parker, G. M. Clark, and J. A. McEvoy, Toronto.

The King Radiator Co., Toronto, have been incorporated with a capital of $100,000, to manufacture radiators, boilers, soil pipe, steamfitters' supplies, etc. The provisional directors include G. Russell, G. M. Clark and J. A. McEvoy, Toronto.

The Kingston Harness Works, Kingston, Ont., have been incorporated with a capital of $40,000, to manufacture harness, leather goods, etc. The provisional directors include T. W. Suddaby, C. F. Suddaby, Kingston, Ont., and J. Bedard, Gananoque, Ont.

On the morning of June 18 fire did damage to the machine shop of Wm. & J. G. Greey, of Toronto, to the amount of $7,000, which was covered by insurance. Work is already under way towards restoring the injured building and equipment.

The new plant of the Nichols Chemical Co. of Canada, at Sulphide, Ont., made its first shipment last month.

The plant of the Niagara Falls Machine & Foundry Co., Niagara Falls, Ont., is busily engaged turning out a large number of hydrants both two and three way for the cities of Toronto and Hamilton, as well as heavy castings for various machine tool manufacturers in the province. A large contract for the entire castings required for their new plant by the Ontario Iron & Steel Co., Welland, Ont., has just been filled.

Canadian patents recently issued by Featherstonhaugh & Co. include W. R. Hampden, Toronto, Ont., heating stoves, Supreme Heating Co., Limited. J. M. Woodiwiss, Windsor, Ont., cement blocks; E. A. Sullivan, Toronto, Ont., non-fillable bottle attachments; T. A. Blakely, Flesherton, Ont., anti-friction bearings.

The plant of the Tobin Mfg. Co., Bromptonville, Que., was damaged by fire June 1. Loss about $50,000.

D. G. Loomis & Sons, Montreal, contractors, have purchased property at Cote St. Paul, Que., and will establish a large brick making plant.

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

The Temple Building on St. James Street, Montreal, which cost $200,000, a few years ago, has been sold for $3,000, and will be torn down to make way for the new Bank of Commerce Building.

The council, St. Jerome, Que., have granted exemption from taxes for ten years to the Safety Explosive Co. of Canada. The company purpose erecting a new factory.

A post office will be erected at Knowlton, Que., at a cost of about $5,000.

The Water Committee of Montreal are asking for $17,000 for the purpose of extending the water supply to Rosemount, the new annex of the city.

The ratepayers of Sherbrooke, Que., will be asked to vote on a by-law to raise $200,000 for the purpose of developing the water power at Westbury, Ont.

Mitchell & Crighton, Montreal, have completed plans for the new building of the First Baptist Church, Montreal, to be erected at the corner of Sherbrooke St. and Union Ave. The total cost will be about $75,000, and the building is expected to be ready for occupation about Christmas.

The Canadian Leather Goods Co., Montreal, have recently added new offices and show room, covering about 500 square feet, to their premises at 413 St. James Street. During the three years of its history this business has shown a gratifying growth. Since January last, the firm have been represented by two travellers in the West, and their goods, notably their ladies' chatelaine bags, of which they make a specialty, have been favorably received from the Atlantic to the Pacific. The new show room has been fitted up with a view to taking full advantage of their central situation, and displays their full line of goods to the best advantage.

C. A. Sharpe, Montreal, have removed from 25 and 29 Notre Dame Street East to larger premises at the corner of Craig and Gosford Streets, being 239 Craig Street East and numbers 37, 39, 41 Gosford Street, where they have facilities for the enlargement of business and the introduction of new special features.

A. O. Morden & Co., Montreal, are installing machinery for the manufacture of cashmere hosiery for the next spring trade.

The firm of H. Shorey & Co., Montreal, have been re-organized under the name of Male Attire Limited, and are establishing agencies throughout Canada.

W. B. McLean & Co., Montreal, have amalgamated with the Dynamic Machine Works, Limited. The office at 301 St. James Street has been retained.

Messrs. Scott & Rubenstein, Montreal, electrical contractors, formerly J. E. Scott & Co., have removed from 246 St. James St. to 342 St. James St. Among recent contracts of note are the electrical work for the Westmount school, and for the Crescent Turkish Bath Hotel; a 50 h.p. motor for the quarries of T. A. Morrison & Co., and motors, generators, switchboards, and 800 lights for the new premises of L. O. Grothe & Co., corner of Ontario and Main Streets, Montreal.

A. Ramsay & Son Co., Montreal, have moved their offices from Recollet St. to 10-22 Inspector St., where they have just completed a six-story building, and now have store houses, offices, sample, shipping and receiving rooms all together.

The Crescent Hat Works, Montreal, manufacturers of men's, boys' and ladies' felt hats, have moved to 579 St. Paul St. Last September, after less than three years in business, they were burned out, but promptly secured premises on Lemoine St., and the growth of business during the past nine months has forced them into larger premises.

The Century Electric Co., Montreal, have moved from Inspector St. to 579 St. Paul St.

The Hamilton Powder Co., Montreal, are replacing their direct current power and lighting plant with an alternating current plant. The Century Electric Co. are the contractors.

Swift, Copeland & Co., Montreal, will build a fireproof factory at 517-527 St. Paul St. The plans call for a building of six stories and basement, mill construction, about 90 x 90 feet. It will be equipped with freight and passenger elevators, and sprinkler system will be installed. One floor may be rented for factory or warehouse purposes. Work will commence at once. H. C. Stone, Montreal, are the architects.

The sixth floor of the addition to the Coristine Building, Montreal, now in course of erection, has been leased to the Canadian Fire Underwriters' Association. The addition is about 80 x 61 feet, of similar construction to the rest of the building.

The Acme Glove Works, Montreal, have moved their glove department to 236 Craig Street East. The premises at 311 St. Paul Street are now reserved for the coat factory. The change doubles their capacity in all departments.

The W. L. Thorn Oil Co., Montreal, manufacturers and dealers in lubricating oils, have moved to larger premises at 11 St. Therese St.

The Redmond Co., Limited, Montreal, will erect a handsome building on the site formerly occupied by the Montreal Biscuit Co., who were burnt out a year ago. The plans, prepared by Messrs. Ross & MacFarlane, Montreal, call for a reinforced concrete building, four stories and basement, with a frontage of 77 feet 6 inches on Inspector St., and a depth of 161 feet. Construction will be fireproof throughout, metal sashes and wired glass windows being used. A sprinkler system, with a 25,000 gallon tank will be installed. The building will be equipped with electric elevators, and an up-to-date low pressure steam heating system. The new building will enable the Redmond Co. to bring their fur factory, sheep-lined coat factory, and cap factory, now operating in different parts of the city, under one roof. The total cost of the building will be in the neighborhood of $125,000, and it is to be completed about May 1, next.

The Geo. W. Stevens Estate, Montreal, are erecting a handsome building on St. Antoine Street which, it is stated, is to be occupied by The Gazette. The building will be four stories in height, of pressed brick, with concrete foundations. The front will be granite at the base and pressed brick above with trimmings of Indiana limestone. The architects are T. Pringle & Son, and Rexford-Bishop are the contractors.

Williams & Wilson, Montreal, are building a large addition to their premises on St. James St., Montreal. The new building will be 53 x 100 feet, four stories and basement. The top flat will have concrete floor, and will be used for machine shop; the ground floor will be used for warerooms, and the first for offices. A 40 h.p. Kynoch suction gas engine will be used for power and lighting. C. E. Deakin, Montreal, are the contractors.

The Jacques Cartier Pulp & Paper Mill, Pont Rouge, Que., have completed enlargements, doubling their capacity.

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

The saw mill of Messrs. J. C. Gilbert & Sons, Bishops' Crossing, Que., was destroyed by fire June 6.

La Cie. O. Poirier, Montreal, have been incorporated with a capital of $100,000, to manufacture leather, boots, shoes, shoe dressing, blackings, gloves, etc. The charter members include O. Poirier, A. Gibeau, and J. L. Tining, Montreal.

J. B. Gratton, Limited, Montreal, have been incorporated with a capital of $40,000, to manufacture doors, sashes, blinds, etc., and to carry on a contracting and constructing business. The charter members include J. B. Gratton, W. Clark and T. J. O'Neil, Montreal.

The Ethelwold Steamship Co., Montreal, have been incorporated with a capital of $20,000, to manufacture steamships, vessels, boats, etc. The charter members include H. J. Hague, S. D. Harris, and A. Charters, Montreal.

The North American Mineral & Timber Co., Montreal, have been incorporated with a capital of $49,000, to manufacture minerals, timber, lumber, etc. The charter members include H. P. Adams, W. Tees and H. J. Cassard, Montreal.

The premises of the Amherst Suspender Co., Amherst, N.S., were destroyed by fire June 13.

D. J. Kirk, Antigonish, N.S., has purchased property at North Sydney, C.B., on which to erect a large block.

A branch of the Bank of Nova Scotia will be erected at Windsor, N.S., at a cost of about $15,000.

The old Y.M.C.A. Building, Halifax, N.S., has been sold for $20,000, and a new one will be erected.

A telephone line is to be constructed between East Dover, Terrence Bay and Lower Prospect, N.S.

The Shelburne Electric Co., Shelburne, N.S., have awarded the contract to the Canadian General Electric Co., for the electrical equipment of their plant.

The city treasurer, Halifax, N.S., is calling for tenders for the purchase of $768,500 worth of debentures. The amounts to be spent on municipal work are as follows:—Pavements, $75,000; sidewalks, $150,000; improving fire department, $70,000; water extension, $135,000; sewerage, $50,000; school houses, $95,588; street extension and various purposes, $122,500.

The premises of the Canada Woodenware Co., and G. T. Barnes & Son, Hampton, N.B., were destroyed by fire June 7. Loss about $50,000.

Negotiations are under way for the amalgamation of the New Brunswick Foundry Co., Fredericton, N.B., and A. Dunbar & Sons, Woodstock, N.B. If the amalgamation is consummated the company will probably go in for the manufacture of cars.

The Department of Public Works, Fredericton, N.B., invites tenders up to July 8 for the construction of two metal superstructure spans of 252 feet 8 inches each from centre to centre of end bearings, over the St. John River.

J. S. Neill, Fredericton, N.B., has been awarded the contract for the supply of sewer pipes to that city at 9½ cents per foot.

A copper mine has been discovered on the banks of the St. John River, near Woodstock, N.B.

The Transcontinental Railway Commission invite tenders up to June 25 for the construction of eight miles of their line in New Brunswick, running easterly from Chipman.

The large hardware store of W. A. Mills, St. Stephen, N.B., was damaged by fire June 12.

The Board of Education, Sydney, C.B., are considering the erection of a new High School building, at a cost of about $40,000.

The Geo. Craig Co., Winnipeg, Man., have purchased property for $47,400, and will erect a large dry goods block.

A fire protection system will be installed at Gretna, Man.

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

The Sylvester Bros. Mfg. Co., Brandon, Man., have secured a site on which to erect a new warehouse.

The G. F. Stephens Co., Winnipeg, Man., will erect an addition 53x36 feet to their factory, which will extend from the paint factory to the storage warehouse along the spur track, and will be of brick with stone foundation, four stories. Fireproof doors, and metal frame windows with wire rolled glass will be installed.

The Dominion Government invites tenders up to June 24 for the construction of an armory building at Brandon, Man. The building will be three stories, 130x75 feet, and will be of Roman architecture.

Messrs. Gooderham & Worts, Toronto, the Hiram Walker Co., Walkerville, Ont., Joseph Seagram, Waterloo, Ont.; the Wiser Co., Prescott, Ont.; Harry Corby, Belleville, Ont., and the Hamilton Distilling Co., Hamilton, Ont., all of whom are interested in the General Distillery Co., of Toronto, are completing arrangements to institute a great distillery plant in Winnipeg, Man. Thirty-five acres will be required for the plant, one of the largest on the continent.

The May-Sharpe Construction Co., Winnipeg, Man., have been awarded the contract for the erection of the Roblin Hall, in connection with the Manitoba Agricultural College, at a cost of about $106,000.

J. W. Peck & Co., Winnipeg, Man., will erect a large addition to their wholesale warehouse.

The Board of Control, Winnipeg, Man., invite tenders up to June 26 for the supply of 100 arc lamps and two regulators for extension of street lighting system.

Messrs. J. G. Hargrave & Co., Winnipeg, Man., have been awarded the contract for the construction of the Shedo extension of the Canadian Pacific Railway, a distance of 50 miles.

Secretary Board of Control, Winnipeg, Man., invites tenders up to September 3, for the construction of the power plant at Point du Buois, Man.

The J. McDiarmid Construction Co., Winnipeg, Man., have been awarded the contract by the Canadian Pacific Railway Co., for the construction of round-house on their line at Cranbrook, B.C., Coleridge, Strathcona, Alta., and Swift Current, Sask.

The Grand Trunk Pacific Railway Co., and the Great Northern Railway Co., are considering the erection of a passenger station at Portage la Prairie, Man.

The Canadian Northern Railway Co. are purchasing the right of way for their line to run from Virden, Man., to Regina, Sask. This will give the latter city direct connection with Winnipeg and the Great Lakes.

The American Steel Mine Co., Cleveland, Ohio, will erect a factory near Lethbridge, Alta., at a cost of about $2,000,000.

W. P. Hansen, Lethbridge, Alta., will erect a sawmill on the Belly River at a cost of about $50,000.

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

E. D. Stimpson, Calgary, Alta., has been awarded the contract for building three bridges near Calgary. One is to be built over Iron Creek.

A post office will be erected at Maple Creek, Sask., at a cost of about $5,000.

A new Orange Hall will be erected at Frobisher, Sask.

A new school will be erected at Fillmore, Sask., at a cost of about $15,000.

The Plum Coulee Milling Co., Arcola, Sask., will erect a new grist mill this summer.

Messrs. Chency & Clain, of the Union Supply Co., of Rosthern, Sask., are preparing to erect a mill in North Battleford, Sask., at a cost of about $20,000. When completed the mill will have a daily capacity of 100 barrels.

The J. J. McLaughlin Co., of Toronto, have begun operating the new factory recently established in Edmonton, Alta. The premises formerly occupied by the Edmonton Wool & Wood Co. have been completely renovated and altered for the purpose of manufacturing all classes of soft drinks and "Hygeia" water.

The Robert Bell Engine & Thresher Co., Seaforth, Ont., will erect a large warehouse at Moose Jaw, Sask.

A school building will be erected at Caron, Sask., at a cost of about $7,000.

The Brewing & Malting Co., Lethbridge, Alta., will erect an addition to their plant at a cost of about $35,000.

The Lethbridge Iron Works, Lethbridge, Alta., will double the capacity of their plant.

The Alberta Pacific Elevator Co. are making preparations to build a large elevator at Calgary, Alta. Grading has been commenced for the building. The new plant will be a concentrating point for all branch elevators and will make Calgary the greatest grain distributing centre in the West.

Messrs. A. R. Colquhoun & Son, Broadview, Sask., are erecting a large store at a cost of about $25,000.

Mayor Smith, Regina, Sask., will erect a business block at a cost of about $40,000.

Messrs. McAra & Mowat, Regina, Sask., will erect an office block at a cost of about $30,000.

The ratepayers of Regina, Sask., voted favorably on by-laws to raise $425,000 for pavements, granolithic sidewalks, sewerage, waterworks and electric extensions.

Work has been started at the saw mills of Messrs. D. R. Fraser & Co., Edmonton, Alta. The plant has been greatly increased since last fall and there has recently been installed a large amount of new machinery, making the handling capacity almost double what it formerly was. Among the new machinery was a Jerome Wheelock, Goldie McCulloch, 100 h.p. engine, a steam canter for turning logs on the carriages when being sawn, a lightning matcher, a lumber edger and a new transfer table.

The Schwartz Brick Co., of New York, are erecting a brick-making plant at North Battleford, Sask., at a cost of about $75,000.

Very valuable beds of marl have been discovered on the Saskatchewan river, near Edmonton, Alta.

The walls of the new addition to the warehouse of the Cockshutt Plow Co., Calgary, Alta., collapsed June 8. The loss will amount to about $10,000,

A one hundred barrel flour mill will be erected at Rosthern, Sask., at a cost of about $20,200. G. C. Paterson, Rosthern, is interested.

The Edmonton Standard Coal Co., Edmonton, Alta., have increased their capital from $300,000 to $500,000.

The Canadian Pacific Railway Co. will erect, in the near future, a large summer hotel on Kitsalano Beach, Vancouver, B.C. It is expected it will be the largest hotel on the Pacific coast.

The offices of the Brunette Sawmill Co., and the post office, Sapperton, New Westminster, B.C., were destroyed by fire June 4. Loss about $50,000.

The congregation of the Methodist church Salmon Arm, B.C., will erect a new edifice.

Messrs. Ironsides, Rannie & Campbell, Vancouver, B.C., have been awarded the contract for the construction of the Eburne-New Westminster railway line.

The Grand Trunk Pacific Railway Co. have begun the construction of their branch line from Kitamaat to Kitsalas Canyon, B.C.

A large power house will be erected in connection with the Canadian Pacific Railway hotel at Victoria, B.C., at a cost of about $40,000.

Vancouver, B.C., will shortly call for tenders for water pipe for new mains, involving an expenditure of $10,000.

The Johnston Wharf Co., Vancouver, B.C., have awarded the contract for the construction of their wharf to the British Columbia Contract Co. It is expected the wharf will be about 600 feet long.

H. Macdonald, Victoria, B.C., has been awarded the contract for the laying of sewer pipes in Fernie, B.C., at a cost of about $30,000.

The Victoria Gas Co., Victoria, B.C., intend making considerable extensions to their plant this summer.

The Cranbrook Electric Light Co., Cranbrook, B.C., has been organized and will build a dam and power house on the St. Mary's River.

PUBLICATIONS.

HOME HEATING. Andrews Heating Co., manufacturers, contractors and consulting engineers, have issued a seventy-one page catalogue giving an idea of the class of work turned out by them. This company sells direct from the factory to user.

IRON WHEELS. The Dominion Wrought Iron Wheel Co., Limited, of Orillia, Ont., have issued a catalogue describing the wheels and wagons manufactured by them. This firm makes a specialty of iron wheels which are guaranteed for one year. The wide tires of these wheels are a feature.

INDUCTION MOTORS. Bulletin No. 1118, issued by the Canadian Westinghouse Co., is devoted to the Westinghouse type CCL Phase Induction motors which are being so extensively used in all classes of industrial work. Illustrations are given of the various parts of the motor as well as a number showing its being adapted to various uses.

THE RAPID TOOL CO. A thirty-two page catalogue has been issued by the Rapid Tool Co. of Peterboro, Canada, giving illustrations and prices of the auger bits, car bits, ship augers, and all kinds of wood boring tools.

ANNIVERSARY NUMBER. The CANADIAN MANUFACTURER is in receipt of a copy of the handsomely gotten up anniversary book commemorating the fifteenth aniversary exercises and banquet of the International Correspondence School, Scranton, Pa. Half tone illustrations are given of Mr. T. J. Foster, the founder and president as well as others intimately connected with the company. A list of anniversary guests, besides the various members of the faculty, includes the various division superintendents and I.C.S. representatives, as well as a representative list including the best known men in America amongst the educators, national, state and municipal officials, publishers, editors and newspaper representatives, engineers, manufacturers, railroad officials, labor union representatives, bankers, clergy, lawyers, judges and physicians, scientists, business men and students. The book gives a comprehensive idea of the work and scope of the schools, their text books, methods of teaching, etc, besides inspirational addresses given at the banquet by leaders of thought in various lines. The International Correspondence School might be congratulated on the showing made as outlined in this book.

COTTON FABRICS WITH WHITE AND COLORED WOOLEN EFFECT THREADS.

An extremely interesting shade card has been issued by Leopold Cassella & Co., G. m. b. H., copy of which may be obtained upon application. It illustrates a process patented to Leopold Cassella & Co. and shows cotton dyeings with white or colored woolen effect threads, dyed in the piece. The substance of the process is as follows:

In order to obtain clear woolen effects in cotton goods, the pieces are freed from dressing and then mercerized. The latter operation may be carried out in the usual manner, in machines combined with a tentering frame, and with a lye of 52° Tw., which should be used as cold as possible. In case a machine of this kind is not available, the mercerizing may be done in a padding machine or in a jigger with a lye of 21-23° Twaddle, which should be cooled off to about 8-10° C. (45-50° F.); in the latter case the goods are treated in the lye for about five minutes. After mercerizing, the goods are squeezed off well, neutralized immediately in a cold bath charged with sulfuric acid and rinsed well.

LOOSE-LEAF SYSTEM FOR WINNIPEG.

At the May meeting, the special committee on civic accounting received the report of the experts appointed to re-organize this department and on their recommendation it was decided to award the contract for supplies to The Rolla L. Crain Co., Limited, of Ottawa, their goods being, everything considered, the best adapted to the city's requirements. Tenders were received from several local firms as well as eastern manufacturers, but it being a question of quality as well as price, the Crain bid was accepted. Winnipeg intends to install the Loose-Leaf System through all the civic offices in the near future, this is a move in the right direction and they are to be congratulated on their latest move.

AMERICAN WATERWORKS CONVENTION.

Toronto, the popular convention city, was the scene of an important gathering on June 18, 19 and 20, when the American Waterworks Association held its annual convention at which were gathered men from every part of the United States and Canada, to the number of over three hundred. A civic welcome was tendered the delegates by Mayor Coatsworth. The address of the president, Dakney H. Maury, Peoria, Ill., included a paper on the "Rates of Water Service." A report of the standing committee on electrolysis was received in which no remedy was offered to offset existing evils.

At the afternoon session five papers were read being "Meters and Meter Systems" by Wm. Volhardt, Stapleton, N.Y., "The Cost of Meters in Rochester," by Geo. W. Rafter, "Water Consumption, Waste and Meter Rates," by city engineer, Jas. L. Tighe, Holyoke, Mass. "Some Notes on Rules, Ordinances and Court Rulings," by S. J. Rosamond, Fort Smith, Ark., and "The Care of a Mechanical Filter Plant," by Secretary J. M. Diven, Charleston, S.C.

Two of the papers presented at the evening session were illustrated by lantern slides, these were "The Detection of Waterworks Losses," by Edward E. Cole, New York, and "Gas Producer Pumping Plant at St. Stephen's, N.B.," by E. A. Barbour, Boston. Another paper read was that on "Greater Economy in Small Pumping Stations," by Capt. H. G. H. Tarr, of Philadelphia.

The officers elected for the coming year are: George H. Felix, Reading, Pa.; 1st vice-president, D. W. French, Hoboken, N.J., 2nd vice-president, Dr. W. P. Mason, Troy, N.Y.; 3rd vice-president, Jerry O'Shaughnessy; Columbus, Ohio; 4th vice-president, Alexander Milne, St. Catharines, Ont.; 5th vice-president, Charles Henderson, Waterloo, Iowa; secretary-treasurer, John M. Diven, Charleston, S.C. The finance committee was re-elected.

The next convention will be held at Washington.

A FLOURISHING BRICK PLANT.

How the Laprairie Brick Co., Montreal, make their bricks from shale rock was demonstrated to a large company of gentlemen comprising architects, builders, contractors, merchants, and others interested, who were taken to Laprairie a few days ago by special train to witness the opening of the new plant laid down by the company.

The shale rock which forms the material from which the bricks are made lies in a large bed closely adjoining the extensive plant. Here it is scraped up into small cars and transferred by electric power into crushers and ground into fine powder. For the best bricks those used for facing and ornamental work this fine powder is compressed into shape by presses capable of turning out 18,000 per day. For common bricks the powder is moistened and issues from a machine in a long oblong strip of clay which, travelling on an endless belt, is carried under a revolving wheel on which strings of wire cut the strips into brick-shaped lumps. These are rapidly caught, as they are travelling, by men and transferred on to trolleys.

These bricks are manufactured at the rate of 100,000 per day, per machine, while one machine is capable of producing from 125,000 to 150,000. The unbaked bricks are carted into the drying chambers and dried for 24 hours. The next transition is to the kilns, which are constructed on the "continuous" system in which the fire travels from one chamber to another. Here 36 hours of fierce heat finishes the process, and the bricks are turned out with a strength and durability which is astonishing.

The whole process is marked by much ingenuity, all of which goes to the saving of labor. Every possible use is made of electric power, and not even is the heat of the kilns lost, as by means of a system of fans and underground channels it is transferred to the drying chambers. All the modern machinery is worked by motors, the power being supplied by the Montreal Light, Heat & Power Co.

MEERSCHAUM CO. LOOKING FOR LOCATIONS.

The Meerschaum Co., of America, 25 Broad Street, New York, have been organized with a capital of $6,000,000, and are trying to locate advantageous sites for a number of factories in which the products of the company's mines in New Mexico are to be turned into commercial articles, including pipes, cigar and cigarette holders, insulating devices for electrical apparatus, etc. W. J. Seidenburg, formerly of the American Tobacco Co. is president of the Meerschaum Co.

A NEW AUTOMOBILE.

A new automobile called the "Niagara," of Canadian manufacture, is being built and placed on the market by the Standard Bearings, Limited, Niagara Falls, Ont. The first car to be turned out by this company has just been given a very severe test which has been highly satisfactory to the manufacturers. It is a high class 4-cylinder 20 h.p. car handsome in appearance, well adapted for running over rough roads. A notable feature is its equipment with D-S and L bearings throughout. After running over a thousand miles under all conditions, the bearings were closely examined and found to be the same as before the test. A set of these were shown to CANADIAN MANUFACTURER by Mr. Joseph Dove-Smith, managing director of the company, and found to be in perfect condition, showing clearly the adaptability of these to automobiles which has been demonstrated beyond question. In future all cars turned out by the factory will be fitted with these bearings.

THE SOUTHAM BUILDING.

The Gillette Safety Razor Co., Montreal.

The Smith Patterson Co., Limited, wholesale manufacturing jewelers, Montreal.

The Montreal Watch Case Co., Limited, manufacturing jewelers.

Southam, Limited, ticket printers, Montreal.

About Sept. 1, next, the above firms are to be the fortunate tenants of an admirable factory building now being erected at 63 St. Alexander St., Montreal, by Southam, Limited.

The building will consist of five stories and high basement, 250 x 35 feet, and will be lighted on all sides. The construction is of reinforced concrete, with metal window frames and wired glass windows. The building will be equipped with sprinkler system throughout. Freight and passenger elevators will be installed.

The concrete work is being done by the Hennebeque Construction Co., New York, and the brick work by Byers & Anglin, Montreal. Brown & Vallance, Montreal, are the architects.

ONTARIO WATER POWER.

Ontario possesses nearly 350,000 h.p. water in the Algoma, Thunder Bay and Rainy River ditsricts. This fact is shown in detail and amplified exhaustively in the fifth report of hydraulic commission, which has just been issued covering this great district All the water powers of the province, except James Bay, have been reported upon. Three transmission plans are recommended, as follows:—

1. A line from Dog Lake to Port Arthur, Fort William and vicinity.

2. A line from Cameron Rapids, on the Nipegon to Port Arthur, Fort William and vicinity.

3. A line from Slate Falls, on the Mississuaga to Thessalon and Bruce Mines.

This would furnish power full capacity 24-hour basis at sub-station for (1) $9.10 h.p.; (2) $9.75; (3) $14.72. To this distribution would have to be added.

SUBSTITUTE FOR SOLE LEATHER.

Lewis H. Southwick, a Peabody tanner believes that he has a practical substitute for sole leather. He has a process of making soles of canvas, and waterproofing them, and he is arranging to put soles on the market to retail, it is understood, at a price of 10 cents per pair. His soles are to be made of a special weave of canvas. They will be applied to the shoe between the inner and the outer sole, and they will extend from the toe to the heel They may be used on new shoes as well as on old shoes which are being tapped.

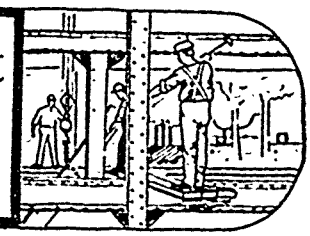
Mr. Southwick has been experimenting more than a year with his canvas soles, and he has had many pairs of shoes made up with canvas soles. He has also given his canvas soles to his friends to be used in whatever shoe they may have resoled. The success of his experiments has led him to decide to have canvas soles made up for the market, but he has not yet completed his arrangements.—American Shoemaking.

CLEANING MACHINERY.

A German machinist gives the following very practical recipe for cleaning parts of machines made of polished iron: He puts a quart of petroleum in a bottle and adds to it a small quantity of paraffine in the form of shavings. The bottle is corked and allowed to remain for a couple of days, care being taken to shake it from time to time. The mixture is then ready for use. The mode of using is as simple as the mixture; the bottle is well shaken and the mixture spread over the parts to be cleaned with a piece of rag or a brush. The next day the oil is wiped off with a dry woolen rag, the rust, gummed oil, etc., going along with it, and leaving the machine in a very satisfactory condition. The paraffine neutralizes the oxidizing effect of the petroleum, while the expense is insignificant.

Construction and Equipment

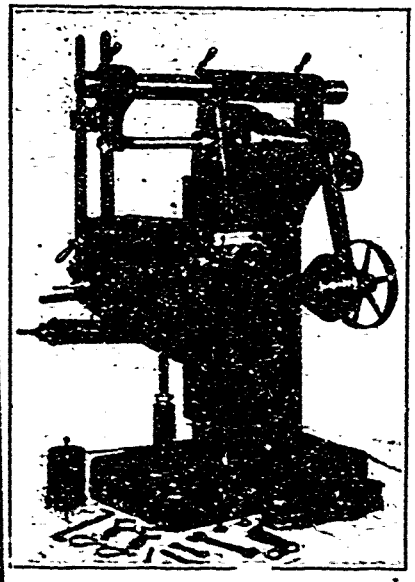
Giving information regarding modern materials and methods for the construction of factories, mills, etc., and about machinery and power appliances for their equipment.



NEW MILLING MACHINES.

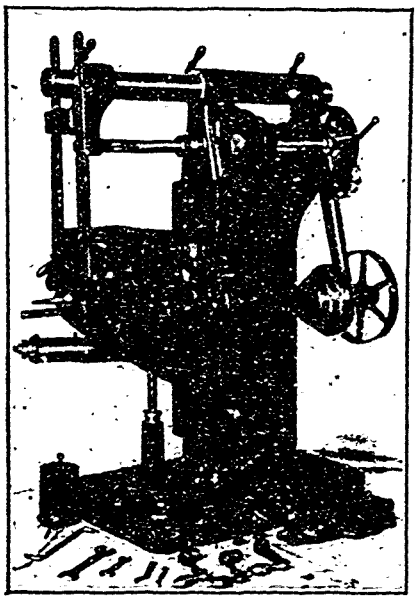
These machines are made in two styles, back geared, and not back geared respectively, known as No. 25 and No. 26. In their design special attention has been paid to the requirements of the manufacturer of small machine parts, which are produced in large quantities such as found in small arms, typewriters, sewing machines, and electrical works. In bringing out the new model, special attention has been given to the feed works that they may be able to withstand the full power of the driving belt, and at the same time give good service in the rough usage to which these machines are subjected. This new feed is driven by belts which get their motion from the spindle of the machine by means of a train of gears, so arranged that the velocity of the belt is sufficient to drive all feeds that the main belt will stand. The changes of the feed are obtained by four step cones and by interchanging the feed driving pulleys in the back of the machine, giving in combination eight changes from .007 to .100.

The table is operated by worm and hobbed rack, the worm being driven by means of a worm gear of large size and worm of coarse pitch and of correspondingly high efficiency. The arrangement for disengaging the feed is by a new and novel drop worm mechanism, by which the worm is thrown out of mesh with the gear, and leaves in a path at right



Becker-Brainard Milling Machine.

angles with the axis of same overcoming the objection of the old style gravity drop worm of clinging to the gear by friction alone. It also equalizes the wear on the worm gear teeth. The worm is also engaged and thrown out of mesh by the same lever, making in all a neat, convenient and positive method of automatically disengaging the feed and stopping the travel of the table at a predetermined point. The table is also supplied with a hand quick return of 4 to 1 ratio, allowing it to be returned to the original position in the least possible time.



Becker-Brainard Milling Machine.

The knee of the new model has been lengthened sufficiently so that a harness brace may be used for the arbor and still have a cross range for the table equal to that of the old style machines. This harness is especially worthy of notice and makes for convenience as well as rapidity. It consists of a brace which is gibbed to the knee slide; a clamp that is fastened to the arbor support yoke in a manner that allows it to be swiveled around its centers, allowing the brace to be removed without removing any bolts. This clamp is made fast to the brace by friction which gives a more rigid hold than the old style bolt washer and slot arrangement, at the same time allowing of a much stiffer brace. The convenience of this device will be at once appreciated by the operator. The arm which is a solid steel bar, is adjustable lengthwise.

These machines are equipped with a rigid box knee and with a telescopic elevating screw, allowing the machine to be set at any position without regard to beams on floor construction, as the screw does not project below the floor line.

The base of these new model machines has been designed on the same lines as the other Becker-Brainard machines, which are extra heavy, absorbing all vibration.

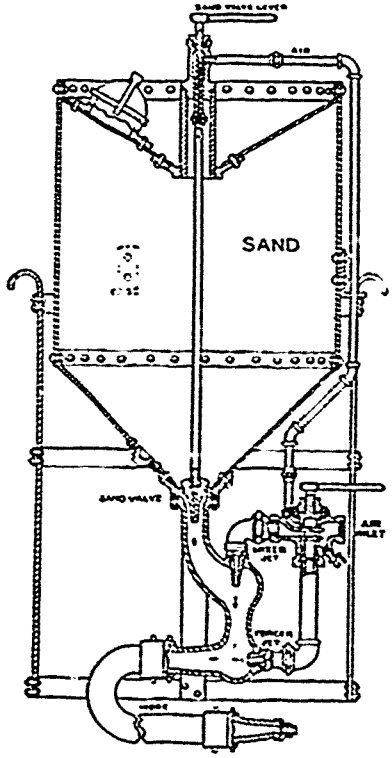
The spindle cone and back gears are of the standard Becker-Brainard design, the spindle bearing being cylindrical in form, the wear being taken up by concentric compensating bronze boxes.

The appearance of the machine has in no way been neglected, since new patterns were made throughout. Great care was given to the symmetrical appearance of the machines as a whole all corners being well rounded and the graceful outlines speak for themselves.

INJECTOR SAND BLAST.

The injector principle as commonly applied to steam injectors, has been adopted in sand blast apparatus. Several air jets impart the necessary high velocity to the sand. The quantity of air can be controlled and directed.

With it castings can be cleaned, scale and rust removed from steel structural work, dirt and weather stains from the stone and brick work of buildings, and other similar work performed, with the minimum amount of air, sand and pressure.



Dryclife Sand Blast.

The injector sand blast apparatus com-

prises a steel or other sand tank suitably supported and provided with lugs for convenience in slinging. The top is depressed, allowing the tank to be easily filled, and the sand filling hole is closed by a special locking device. On the top of the sand tank is a small bonnet through which is led a vertical hollow stem terminating in the sand valve at the bottom of the tank. To balance the pressure on the sand, the air pressure is admitted to the sand tank through the vertical pipe shown outside thereof connected to the bonnet, the vertical stem being perforated.

Extending vertically through the sand valve is an air jet, admitting the compressed air into the injector casting, and producing a vacuum, which causes the sand to flow with evenness and regularity.

Below this jet is the mixing chamber, provided with a second vertical air jet, connected to the direct air supply, acting upon the mixture of air and sand and putting it into action, its velocity being increased by contracting the walls of the casting.

Below the mixing chamber is a third and horizontal air jet from the main air supply, forming with the enclosing casting a forcer which delivers the mixed air and sand, now in very active motion, sharply and with full vigor to the work in hand, through a line of rubber hose provided with a special nozzle.

At one side of the sand tank and convenient to the hand is a special cock admitting and regulating the air supply consecutively to the sand tank, the central pipe and the several nozzles in the sand valve, the mixing chamber and forcer, or to all simultaneously, the supply of air being received from an air tank or compressor. A drain cock is provided to remove any condensation from the air.

The hose is connected to the mixing chamber by a patented, specially designed heavy hose coupling, without any sharp corners or edges internally, or any reduction of area.

There are no loose parts to be mislaid. Capacities of these machines vary from 300 to 2,000 pounds of sand. The Canadian rights to manufacture these machines have been secured by the Canadian Rand Co.

Autogenous Welding.

Oxygen and acetylene in a blowpipe flame produce the highest temperature (6300°) of any flame known as a product of combustion. It is 1200° higher than the oxy-hydrogen flame and nearly equals the electric arc.

This process is valuable for replacing riveting and brazing in many instances. Two sheets of metal may be welded by placing their edges in contact and following along the seam with a blowpipe. Practically seamless steel and copper tanks of almost any shape and size may be made by forming the body and ends separately and tracing the seams—joints butt and flush—with a

FIG. 1—WELDING CAST IRON.

blowpipe. Many designs and forms not otherwise possible to construct are made practicable and feasible by this process. This autogenous welding process is especially valuable in the foundry as the blowholes and similar defects in castings and forgings are made good. Cast iron, wrought iron, steel castings and forgings, copper, brass, bronze and aluminum in many forms of construction are effectively welded either in the manufacture of new parts or in repairing accidental breaks.

To insure strength, the joint is slightly overloaded by melting a wire or rod of same material as metal to be welded, at the same time the edges are fused. The unfinished joint is stronger than the body of metal and the finished joint is practically the same.

Any shaped hole can be easily cut in steel plates up to 6 inches in thickness, as with the blowpipe the operator can accomplish cutting feats impossible with a saw. In cutting, the flame is proportionately elongated by pressure to penetrate to the bottom of the cut. The intense heat is so localized that the kerf is practically the same as if a saw were used.

A plant for autogenous welding with this process has recently been installed at the Worcester Pressed Steel Co., Worcester, Mass., which is the second in America.

GENERATING APPARATUS.

The oxygen and acetylene are each generated in a separate apparatus and conveyed through separate pipes to the blowpipe. The distinctive feature which has done the most to make this welding process of wide commercial value is the introduction of a means for producing oxygen. By combining this chemical product with water, chemically pure oxygen is as easily obtained as in uniting calcium carbide and water acetylene is liberated; the chemical reaction in each case being analogous.

The oxygen generating apparatus consists of two lead lined generating chambers arranged with a scrubber and settling chamber between. In making oxygen, one generator is filled with the required amount of lukewarm water to which one chemical charge is added. While this solution is being stirred with an agitator, operated by a crank, provided for the purpose, a solution of iron sulphate and water is added, which acts as a catalyzer. In the following chemical reaction:

$$6\ Fe_2S0_4Aq + 7\ Ca0Cl_2Aq + CuS0_4Aq = 2\ Fe_2(S0_4)_3Aq + CuS0_4Aq + Fe_2Cl_6 + 7\ CaCl + 3\ CaS0_4 + 7\ 0.$$

the oxygen, liberated passes from the gasometer through the scrubber and a water sealed trap into the gasometer; from the

FIG. 2—WELDED STEEL TANK.

gasometer, the oxygen is compressed to 10 atmospheres (147 lbs.) with an air compressor into a pressure storage tank. It is then conducted through ⅜ inch copper piping from which branches of ¼ inch copper piping lead to the blowpipe connections. Reducing valves are arranged so the operator can vary the pressure of the gas at the blowpipe at will. Each blowpipe is supplied with 22 different sized nozzles so the size and power of the flame are varied according to the thickness of the metal to be welded.

The acetylene generator is of the water feed type, composed of a cylindrical shaped tank, which serves as a gasometer and regulator, connected by three water supply pipes to three carbide receptacles or trays, half cylindrical in shape, each containing six compartments. Each tray holds about 12 lbs. of lump carbide. The acetylene is used under practically a uniform pressure varying from 2.2 to 3 lbs. The pressure is obtained and maintained by two water levels in the gasometer, employing as a means the principle of the well known water column, which automatically governs the supply and pressure of the gas. Any pressure in excess of 3 lbs. escapes through a vent or blow off outside the generator building. From the regulator and gasometer, the acetylene is conveyed through a 1 inch main pipe with one ¾ inch branch leading to each blowpipe connection.

A feature of this acetylene apparatus is a "safety valve" located between the blowpipe connections and the acetylene gasometer. This consists of a 1 inch pipe leading into and two 1 inch pipes leading out from a rectangular metal chamber. The

inlet pipe connects with the gasometer. One outlet conveys the acetylene to the blowpipes and the other vents to the outside air. The inlet and outlets are separated by a water sealed trap which prevents any possibility of ignition reaching the generator and gasometer by burning back through the blowpipe supply pipes.

Blow Pipe Reaction.

The blowpipe is of brass construction, specially designed on the injector principle and carefully proportioned for its intended purpose. It is about 24 inches long and weighs 2 lbs. It is provided with two inlets which remain entirely separate practically the entire length of the blowpipe, and enter a mixing chamber with a common outlet at the point of combustion. Acetylene (C_2H_2) is a hydro-carbon colorless gas of an ethereal odor when perfectly pure, but as ordinarily obtained, it is distinctly offensive to the smell. It is an endothermic (heat absorbing gas) nearly as heavy as air, having a density of 0.92 of air. It is obtained by bringing calcium carbide (CaC_2) in contact with water.

The chemical reaction is indicated by $CaC_2 + 2\ H_2O = C_2H_2\ Ca(OH)_2$. As acetylene is so rich in carbon—containing 92.3% —it is possible when mixed with air in a Brunsen burner, to obtain 3100° Fahr., and when combined with oxygen 6300° Fahr. is produced which is the hottest flame known as a product of combustion and nearly equals the electric arc. This is about 1200° higher than the oxy-hydrogen blowpipe flame.

In lighting the blowpipe, the acetylene first turned on full, then the oxygen is

Fig. 3—Welded Parts.

added until the flame has only a single cone. At the apex of this cone is a temperature of 6300° Fahr. In welding, this point is held from ¼ inch to ¼ inch distant from the metal to be welded. Too much acetylene produces two cones and a white color; an excess of oxygen is indicated by the flame assuming a violet tint..

Theoretically, 2½ volumes of oxygen are required for complete combustion of one volume of acetylene. Practically, however, with the oxy-acetylene blowpipe the best welding results are obtained with 1.7 volumes of oxygen to one volume of acetylene. The acetylene is, therefore, not completely burned with the blowpipe, according to the reaction. (1).

$$2\ C_2H_2 + 5\ O_2 = 4\ CO_2 + 2\ H_2O.$$
$$4\ \text{vol.}\quad 10\ \text{vol.}$$

but it is incompletely burned according to the reaction—(2).

$$C_2H_2 + O_2 = 2\ CO + H_2$$
$$2\ \text{vol.}\quad 2\ \text{vol.}$$

This is understood when we consider that at the intense heat produced by this combustion, the water and carbon dioxide formed by reaction (1) are completely dissociated. To this last fact is chiefly due the success of the oxy-acetylene flame as a welding agent. To establish the proper conditions for autogenously welding two metals, it is necessary to bring them to their melting point without carburating or oxidizing. As shown by the formula, this flame consists largely of carbon-monoxide which is being converted at its extremity into carbon dioxide. This, with the hydrogen, form a relatively cool jacket which protects the molten metal and the inner cone from loss of heat.

At the moment of initial combustion, when the acetylene is decomposed into elements of carbon and hydrogen, about 300 B.T.U. per cubic foot, of the gas are generated.

Welding Process.

The total heat, however, generated per cubic foot of acetylene is about 1500 B.T.U., which, aside from the initial decomposition, is furnished mainly by the combustion in oxygen of the carbon into carbon dioxide, and in lesser degree by the combustion of hydrogen into water vapor. Pure acetylene at a pressure of less than 30 lbs., even when passed through pipes at white heat, is perfectly safe, but when mixed with oxygen (or air) is dangerous. An explosive gas mixture enclosed in a pipe does not inflame at once throughout the entire pipe, but from one end of the pipe ignition travels at a certain speed, which increases as the square of the pipe section; therefore, to render safe the use of oxygen and acetylene in the blowpipe flame, the gas mixture is given a speed by pressure greater than the rate of propagation of the flame. No flux or moulds are required to weld metals such as iron, steel and copper, but for alloys, viz., brass, bronze, etc., a little borax or boracic acid moistened with water, is used simply to prevent the volotilized zinc from being deposited on the joint and destroying the weld. This process welds by fusion, forming a perfect metallic union of the parts which is imperceptible after finishing. It is not brazing.

An operator of average ability can weld steel or copper sheets at the rate and cost for gas approximately as follows:

.035 inches (about 1-32 inch) 288 inches per hour, $.0031 per inch; .062 inch (about 1-16 inch) 200 inches per hour, $.0065 per inch; .125 inch (about 1-8 inch) 120 inches per hour, $.016 per inch; .377 inch (about 3-8 inch) 60 inch per hour, $.075 per inch.

Metals 1-4 inch and less in thickness can ordinarily be welded cheaper than riveted. Steel and copper tanks for high and low pressure of almost any dimensions, are effectively welded in place of riveting; broken steel shafts and other forgings repaired, cast iron welded with copper or steel and blowholes and similar defects in castings and forgings made good.

The Worcester Pressed Steel Co. have accomplished some difficult autogenous welding with aluminum, practically overcoming

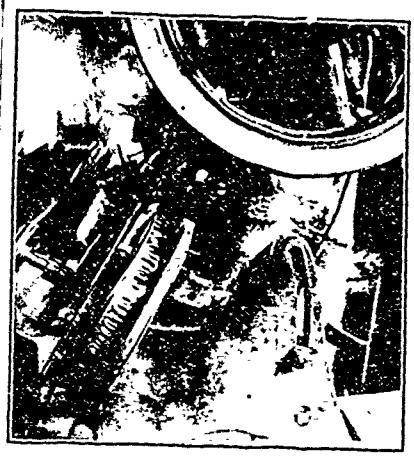


Fig. 4—Welded Cast Iron Power Press.

the trouble from the oxide which forms on the surface of aluminum when exposed to the atmosphere. Although aluminum melts at a comparatively low temperature (1200 degrees Fahr.) it rapidly conducts and absorbs heat and requires a comparatively high local heat to obtain the best results.

MECHANICAL HEATING AND DRYING.

The transmission of heat or of moisture by means of a fan blower is closely allied with the process of ventilation. In an ordinary fan heating system all of the heating surface is massed at the fan, whence the heated air is forced through ducts to all parts of the building. For normal indoor temperatures the outdoor air at zero the incoming supply must range in temperature from 100 to 150 degrees, according to the rapidity of air change within the building. The air thus becomes a medium by which the heat is transmitted to distant points.

The process of drying is only an exaggerated case of heating in which the temperature to be maintained greatly exceeds that required in a well ventilated room. A supply of air sufficient to change the volume once in 8 or 15 minutes in the ordinary structure is all that is necessary to meet the conditions of good heating and ventilation, but a supply equivalent to a complete change in the free spaces within the dry room 60 or more times per hour is required in the lumber dry kiln. The temperature therein will range up to 150 or more degrees. Owing to its greatly increased absorptive power the air at this temperature greedily takes up and carries away the moisture in the exposed surfaces. The method of application and the temperature to be maintained depend entirely upon the character of the material to be dried.

Glue and gelatine require low temperatures and ample volume. Knit goods in the piece are dried by internal application of heated air under pressure which distends the piece the air escaping through the meshes. Cotton,

wool and the like are spread upon beds formed by Covering with netting enclosed boxes into which the hot air is discharged and from which it can only escape through the material above. The materials now dried by hot blast are legion· asbestos, blood, bricks and clay, clothespins, eggs, leather, malt, milk and gun powder, hair, soap, stove linings, sweet corn, yarns and a thousand other products of our industries depend upon the process for their successful production.

What Not to Do.

With a Gasoline Engine.

1.—Don't forget to turn on the cooling water.

2.—Don't forget to open the switch when engine is not running.

3.—Don't forget to oil the engine before starting.

4.—Don't try to wipe the engine while it is running.

5.—Don't use too much gasoline. This causes loss of power, too much soot and deposit. A black smoke out of the exhaust means too much gasoline.

6.—Don't try to start the engine with the cylinder full of gasoline; you can't do it. Shut off your gasoline and turn the engine over a few times to clear out the excess of gasoline.

7.—Don't turn and turn the wheels if the engine don't start; it's no use. The engine will start the first or second turn if everything is right. If it don't look for trouble; see what you have forgotten to do.

8.—Don't fail to carefully look over your engine when it is in first class running order. Learn to know your engine; it will help you to fix it when something goes wrong.

9.—Don't forget to drain the water out of the cylinder in cold weather. Should the water freeze, it will burst your cylinder.

10.—Don't turn the water on the cylinder if it has been heated up without any water in it. If you have forgotten to turn on the water before starting, stop the engine and allow it to cool somewhat before turning on the water. If you turn on the water when the cylinder is hot, you will ruin your engine.

11.—Don't forget to see that all battery connections are tight, and don't forget that your battery should be renewed if it does not give a good snappy spark.

12.—Don't use your engine battery for bells, etc., or you will surely have trouble.

13.—Don't allow any rubbish, wires, nails, cans, to accumulate around your batteries; a short circuit may result and your batteries will be run down.

14.—Don't think your engine needs no attention or care, and don't think it will not wear out.

15.—Don't be afraid to fix your engine. Learn to know your engine and you will be able to fix it.

16.—Don't forget to turn the switch on before starting.

17.—Don't forget to strain your gasoline; any dirt will cause much trouble with your pump, check valves and needle valve.

18.—Don't forget to read the foregoing instructions a couple or three times.

The Manufacture of Aluminum

One of the newest and most interesting industries of this country, says the Bulletin of the American Iron and Steel Association, is the manufacture of aluminum, which is used in the production of domestic and other articles, including machinery that combine lightness with strength, as an alloy with steel and other metals, and largely for the transmission of electric currents as a substitute for copper. Fifty years ago aluminum was a chemical curiosity. Soon afterwards small quantities were produced in Europe for commercial purposes by various processes, but the production abroad did not enter largely into the arts until after the manufacture of aluminum on a large scale was developed in the United States through the invention in 1886 of the electrolytic process by Charles M. Hall, a native of Ohio. This process is now in universal use. In a report of the United States Geological Survey for 1892 the statement was made that "practically all the pure aluminum which has been made in the United States has been made in accordance with the electrolytic process covered by Hall's patents." Mr. Hall's process has so reduced the cost of aluminum that the metal is now in common use. The production in the United States in 1883, before Mr. Hall's invention, was only 83 pounds, a purely laboratory product, but in 1903 it amounted to 7,500,000 pounds, and in 1905 the consumption of aluminum in the United States was 11,347,000 pounds. The production has since phenomenally increased.

In 1888, the Pittsburgh Reduction Co. was organized solely to manufacture aluminum under Mr. Hall's patents, and works for this purpose were built in that year at Pittsburgh. The name of the company has recently been changed to the Aluminum Co. of America. It is the only company in the United States that is engaged in the manufacture of aluminum. In 1890 these works were greatly enlarged and in the following year they were moved to New Kensington, a suburb of Pittsburgh, and again enlarged in 1893. They are still in active operation. Other works now operated by the company are located at Niagara Falls, at Massena, St. Lawrence county, New York, and at Shawinigan Falls, Que. The first works at Niagara Falls were started in 1895, and in 1896 they were enlarged and new works were built.

Alumina made from Greenland cryolite was used at first by the Pittsburgh Reduction Co., in the manufacture of aluminum, but very soon bauxite from Alabama and Georgia was substituted and its use has produced the best results. The bauxite is to-day purified at works at East St. Louis, Illinois, owned by the company, and thence taken to various manufacturing plants of the company and converted into pig aluminum. In 1896 the manufacture of pig aluminum at New Kensignton was abandoned. The works at that place have since been devoted to converting pig aluminum into more or less finished forms. In late years these works have been greatly enlarged.

The first president of the Pittsburgh Reduction Co. was the widely known Pittsburgh engineer, Captain Alfred E. Hunt, who remained its president until his death in 1899. Since Captain Hunt's death R. B. Mellon, of Pittsburgh, has been president of the company, and A. V. Davis, secretary and general manager. The original capital was $20,000; the present capital is $3,800,000.

When first put on the market aluminum was used only in the manufacture of optical instruments, dental plates, and similar light articles. In 1890 the manufacture of aluminum cooking utensils was commenced. One of the earlier uses of aluminum was as an alloy in the manufacture of steel, aluminum being added to the extent of one-tenth of one per cent., or less, to remove the dissolved gases and make the steel solid both for castings and for steel plates. It is so used to-day.

Prior to Mr. Hall's invention in 1886 the price of imported aluminum in United States markets was not less than $15 per pound. In 1888, when the works of the company were started, the price of imported aluminum dropped to $4 per pound. A short time previously the price had been $7 and $8 per pound. The company soon reduced the price of aluminum to $2 per pound, and in 1893 the price ranged from 65 to 75 cents per pound. In 1907 it is 43 cents.

The establishment of the aluminum industry in the United States twenty years ago has not only given a new and useful industry, but, as has been shown above, it has greatly reduced the price of aluminum to consumers, again illustrating the truth, which has been so often emphasized, that prices of manufactured products always fall when we cease to be dependent on foreigners for their supply. The manufacture of aluminum is to-day one of the important and necessary industries of the country, and for its existence we are indebted first to Charles M. Hall, the inventor of the electrolytic process, and next to the engineering skill and executive ability of Captain Alfred E. Hunt.

INCREASING BOILER CAPACITY.

There is no question but that mechanical draft plant has all the advantage in regard to the provision for the future increase of the power plant. When a chimney is built it must be built very much larger than needed in order to allow for future growth, and this means always a greater first cost than necessary; and when the plant has grown so that the chimney has reached its limit of capacity it then becomes necessary to build a new chimney. It is because of this continual growth, the rate of which cannot be foreseen, that many plants are equipped with several cheap steel chimneys, each added as the increase of the plants necessitates it rather than one large brick chimney. In the case of a mechanical draft apparatus the capacity of the plant can be very much increased simply by speeding up the fan, and when this has been done as much as it is advisable or economical, it is cheaper to make an addition to the mechanical draft apparatus than it would be to put up a chimney capable of giving the same draft and handling the products of combustion from the same quantity of coal.

Dusty—Hev you got any kind of a job you want done, lady?

Lady—I'm sorry, poor man, to have to disappoint you.

Dusty—Dat's all right, lady. I just wanted ter find out if I could take a sleep on de next lot here widout bein' worried by offers of work.—Brooklyn Eagle.

Twenty-Five Years Ago.

EXTRACTS FROM THE FILES OF THE CANADIAN MANUFACTURER IN 1882.

In looking through the files of THE CANADIAN MANUFACTURER, back a quarter of a century, the wonderful, almost revolutionary, change that has taken place in the arena of manufacturing industry is shown in startling reality. While the whole world has progressed at a rapid rate by the application of labor saving machinery and devices, electrical apparatus and equipment, improved chemical and manufacturing processes and methods, increased and superior transportation and progressive business systems and devices, nowhere in the world has there been developed a proportionate increase in manufacturing activity as in Canada. Then electric lighting was in its merest infancy and of electric power there was almost none at all. The creating of the electrical industries and what they alone have meant to the civilized world mark an epoch in the world's industrial history unparalleled by any previous generation. Canada's growth has been commensurate with this. In the issue of January 20 of this year the leading editorial is headed "The Electric Light" which to-day makes interesting reading in view of what has since been accomplished.

THE ELECTRIC LIGHT.

"It may be that material improvements will have to be affected in the electric light ere it can be so managed and distributed in small quantities as to be suitable for household uses. While such adaptations of the light as would meet domestic requirements are being waited for, it seems seasonably certain that, in this age of invention and discovery, we shall not have very long to wait for them, either. In the meantime it may be considered as a thing settled that the new light is already a success for the illumination of large spaces. In some of the saw mills of the Chaudiere, Ottawa, it has allowed work to be carried on by night as well as by day; and only the scarcity of logs, due to the extraordinary low water of last summer, has delayed its general adoption in the mills of that district; some of them having had to shut down altogether for want of logs before the close of the season. The Northwestern Lumberman speaks of it as undoubtedly the light of the future.

The line of the new Welland Canal, it is stated, will next season be illuminated from end to end with the electric light, an improvement which will add at least fifty per cent to the capacity of the canal to pass vessels through in any given period of twenty-four hours time. The Grand Trunk Railway Co. is introducing the light into its extensive workshops at Point St. Charles, with such advantages gained as are at once evident and indisputable. At Montreal the greater dispatch given to the loading and unloading of ocean steamers, through the facilities for keeping the work going both day and night, has already proved an estimable boon to shippers. With coal and the steam engine furnishing the motive power, the electric light is still a cheap acquisition for such purposes as hurrying on the dispatch of ocean steamers—cases wherein the saving of even a little time means the saving of a good deal of money. But wherever water power is available, there the electric light may be considered "dirt cheap." Wherever such light as this is wanted, and where at the same time water is running to waste, the case is decided in its favor at once. The Newcastle Chronicle, quoted by Wool & Textile Fabrics, says that in the little town of Godalming, in Surrey, it has after trial since September last proved "successful in the highest degree." In this case water power is used, supplemented with steam, and the two, it is said, are made to pull together efficiently and economically.

An enterprising Ontario manufacturer, who has been thinking of trying the electric light in a woolen factory, sees a certain practical question which must be considered. With only one light for a large space, will not the shadows from the machines and framework keep in the dark, comparatively, many places where good light is wanted? It may be that in some manufactories the electric light will not answer until the problem of its division and distribution to many small illuminating points has been solved, as it almost surely will be before long. Meantime, however, its perfect adaptability, not only to the lighting of large outdoor spaces, but also of public halls and large indoor spaces generally may be regarded as settled."

NOTES.

Below are some items taken from the issues of the first six months of the year 1882.

The North Shore Railway shops at Quebec are being supplied with the electric light.

Messrs. J. H. Killey & Co., Hamilton, delivered last week a compound condensing engine for the city of London.

The Whitman & Barnes Mfg. Co., St. Catharines, are putting up a large new addition to their already extensive works.

The public meeting at Belleville on the 6th of February for discussion of the steel association project was largely attended.

Messrs. Frost & Jones of the Smith's Falls Malleable Iron Works are replacing their old engine of some 15 h.p. with a new one having a capacity of 30 h.p. This is a good sign.

It has been proposed to establish on the Gulf a cod liver oil factory and there is no reason why such an enterprise should not succeed as well in Canada as in other countries.

The Record Foundry & Machine Shop, of Moncton, N.B., is prospering greatly and has been rushed with orders. About twenty five hands are now employed and more moulders are wanted.

The Cossitt Agricultural Works, Brockville, are making preparations to supply the demand for the coming season. They built this year 1,500 mowers, 3,000 horse rakes and 600 reapers.

Messrs. Wanzer & Co., sewing machine manufacturers of Hamilton, have at the present time a force of three hundred men employed, most of whom are working overtime, and they have also recently made additions to their factory.

Mr. W. Buck, of Brantford, manufacturer of stoves, says he had no trade whatever with the northwest previous to the N.P., but that now he cannot supply his orders for goods for that country.

Messrs. McKechnie & Bertram of the Canada Tool Works, Dundas, have just received an order for the complete outfit of machinery for the new car works at Kingston. This makes the third order the firm now have on hand for new car works in Canada.

A number of residents of New Glasgow, N.S., are promoting the establishment of works for the manufacture of steel to be located on the outskirts of the town. It is understood the subscribed capital will be $150,000, more than half of which has already been taken up.

Notice is given in the Canada Gazette of application for a charter by the Penman Mfg. Co., Limited, for the manufacture and sale of all kinds of woolen and cotton goods. Capital to be $250,000. The corporators named in the application are—John Penman, Paris, Ont., W. D. Long, H. J. Long, and C. E. Newberry, Hamilton, and David Morrice, Montreal.

In the matter of a bonus of $5,000 to be given by Brantford to the proposed new wincey factory, a difficulty arose from the fact that Mr. Slater could not find a proper site within the city limits. The city council has very wisely met the difficulty by voting the bonus without restriction as to keeping within the limits and the factory will now be built. Mr. Slater's enterprise in beginning the wincey manufacture marks an important step in the diversification of Canadian industries.

Somebody writing to the Welland Telegraph advises that the people of the town should offer inducements to Mr. E. A. C. Pew to invest some of his capital in manufactures there, which it is believed he is willing to do, on conditions. Mr. Pew, who is understood to have made a good deal of money recently, formerly belonged to the Welland neighborhood. Welland being on the canal, has plenty of water power from an unfailing source, Lake Erie, and coal can be delivered there cheaply, either from east or west. It ought to be a good site for factories of various kinds.

The Canadian Pacific Railway have transformed the town of Perth into a hive of industry. Their workshops there are nearly completed, and 200 men are now engaged in them. They have one shop for car-building 200 feet long by 75 feet wide, another for wood-working machinery 160 feet by 75 feet, a smith and machine shop 120 feet long, a dry kiln, a saw mill, and a boiler house. Their motive power is supplied by a 150 h.p. engine. The workmen include some of the best mechanics in Canada, and it is intended to build all the passenger and

freight cars at that point. The hotels and boarding houses are full, and there is not sufficient accommodation.

The annual meeting of the Ontario Manufacturers Association was held at the Rossin House, Toronto, on Thursday, January 12. On the opening of the meeting the president, Mr. Gurney, made his annual address. He urged the necessity of perfecting the organization as in view of the approaching election it was necessary to put themselves in a position to efficiently protect their interests. He eulogized the National Policy, which he claimed had benefitted not only the manufacturers but the general community as well. The election of officers for the ensuing year was proceeded with, with the following result: President, R. McKechnie, Dundas; 1st vice-president, R. W. Elliot, Toronto; 2nd vice-president, Adam Warnock, Galt; treasurer, George Booth, Toronto; general secretary, A. W. Wright, Toronto; hon. secretary, C. A. Kelly, jr.; executive committee, Edward Gurney, Hamilton; Edward Gurney, jr., John Lamb, Toronto; J. Perley, Ottawa; S. S. Fuller, Stratford; Jas. Smart, Brockville; Hon. D. McInnes, Jas. Watson, Hamilton; Robert Barber, Streetsville; John Riordan, Merritton; W. Wilkie, Guelph.

ELECTRICITY NEEDING TO BE TAUGHT.

The recent advances in the application of electricity to daily life have created a clear demand for an institution where electrical engineers can be properly taught the theory and practice of this profession. At present there is no such training school worthy of the name; and so long as the electric telegraph was the only field for electrical engineers there was little need of one, for electricians were a very small body, and such as were required to go abroad on cable-laying expeditions, or to the foreign stations of submarine telegraph companies, could all be drafted without much trouble from the physical laboratories of our universities and the testing rooms of our cable manufacturers. The natural philosophy class of Sir William Thompson, the distinguished Glasgow electrician, has supplied many young men to the electrical ranks in this way, and some of his pupils are not the least eminent in their profession. Indeed, they are among the most promising of the younger electricians for the inspiration of their old master's example has abided with them. Times have changed now, however, and the introduction of the telephone, the electric light, and the transmission of motive power by electricity, not to mention a thousand miscellaneous adaptations of the current, has rendered it necessary to have an efficient training college for electricians. The interests of the electric light have already suffered by the incompetency of the persons to whom it has been entrusted, and serious accidents to life and property have resulted from the ignorance of those in charge. Electricity above all other physical forces, is a thing which ought not to be dealt with by the unskilled, for it is instantaneous and powerful in its effects. The proposition of Lieut.-Col. Webster, Royal Engineers, President of the Society of Telegraph Engineers, to the effect that the Society should take steps to found a college for the teaching of electrical science, is one to be welcomed, and we trust it will be realized ere long.—London Globe.

The above shows the situation regarding the state of the general knowledge of electrical science twenty-five years ago.

Inventor of Knitting Frame.

Romance may certainly figure in many of the knitted waistcoats and gorgeous stockings worn by our undergraduates today, but these have not so romantic an origin as the first of these articles produced in this country. For tradition has it that William Lee, who in the 16th century invented the knitting frame on which both stockings and waistcoats were produced mechanically, was driven to this piece of ingenuity by the cruel flouting of the lady he loved, who happened to be a stocking-knitter.

Enraged at his failure to make an impression on her heart, he sought to make it on her purse by killing her means of livelihood, and one is glad to read that all stocking-makers combined to frustrate his cruel purpose, with the result that he fled with his invention to France, where he finally died of a broken heart, whether for love of his lady or of his spoiled invention, tradition does not say.

Success Demands Sacrifices.

There are many people who would like to do some splendid thing in the world, something which would be a real credit to their ability, something worth while, but for the terrible price put upon it. It makes them sick at heart to think of all the delightful things they would like to do which they must put aside—the sacrifices they must make in order to do these things. They have the desire, but they haven't the stamina, the grit, or the determination to make the necessary sacrifice—to say no to the multitude of things which tempts them from their aim.

"Why is it," they ask, "that such a terrible price is put upon all the great prizes of life? Why should it be necessary to set aside the thousand and one pleasant things that allure us by the way? Why shouldn't we be able to take them all in—always play when we feel like it, do the pleasantest things, the most attractive thing, as we go along, and still be able to achieve something worth while?"

Think what it means to have reached middle life or later and to feel that one has constantly sacrificed the greater for the less, that which is worth while for that which is pleasant and easy! The trouble with making a business or a profession of following the easy, the pleasant, the desirable things is that we never get anywhere in the process. We do not grow except as we do these things for recreation, necessary change and rest. When we make a business of pleasure the whole man deteriorates, because he was made for work, was made to achieve something worth while, not to spend his life in pleasure hunting. The moment we make a business of pleasure, the pleasure loses its zest, its financial sweetnes, and the man begins to retrograde, says Success.

We must do the thing that is indicated in the blood, that is stamped in our very constitution, or we must pay the penalty in going backward. We cannot advance unless we obey the laws of growth and advancement. Many of us let the lesser crowd out the greater. We have not the stamina to sacrifice present comforts and pleasure and pay the price for the permanent and more enduring. We would rather have the froth of pleasure, as we go along, than the clear wine of that which endures.

The great failure army to-day is full of people who wanted to succeed, to do something really worth while, but who are victims of the pleasures of the moment. They could not forego the comfort, the ease, could not make the little sacrifices of their pleasure, as they went along, in order to do that which would give them the more enduring, the stable achievement. They thought they must have their pleasure as they went along. They could not take the sacrifices for that which endures, for that which is worth while. —N.Y. Com.

Side Thoughts.

EDISON'S PROPHECY.

Speaking of the future of cities and what they will be like one hundred years hence, Thomas A. Edison is credited with saying they will be free from smoke and steam and that the chimney will be a thing of the past, while the waste of coal and other fuel will be stopped through the use of electricity, generated direct from the fuel without the aid of engine, boiler or dynamo. In factories each machine will have its individual motor. Houses will be heated electrically and most of the cities noises will cease. Skyscrapers will be universal in the business section, and the streets will be bridged over at different heights to facilitate transit from one side to the other. He estimates that buildings will then average thirty stories in height, and the greater number will be constructed of concrete and steel. Such buildings, he says, will stand a thousand years or longer.

HE GOT THE JOB.

During the Civil War the captain of a certain company of mountaineers was thoroughly disgusted with the laziness of the sixty men under him, says the Philadelphia Public Ledger. He determined to shame them. One morning after roll-call he tried it.

"I have a nice, easy job," he said, "for the laziest man in the company. Will the laziest man step to the front?"

Instantly fifty-nine men stepped forward.

"Why don't you step to the front, too?" demanded the captain, of the sixtieth.

"I'm too lazy," replied the soldier.

BUT THE JOBBER STILL KICKED.

This story is told of a South Shore manufacturer and a jobber:

The jobber insisted on having his shoe at the old price. The manufacturer insisted that he couldn't make them up at the old rate.

"Cut something out," said the jobber.

"I can't," replied the manufacturer "I've already cut out everything I possibly can."

"Well, try," retorted the jobber. "I'll not pay a cent more for the shoes, and you've got to take something out."

"I'll see what I can do," concluded the manufacturer.

When the jobber got his shoes they had no tongues in them.—Ex.

Our Growing Time.

FIVE YEARS OF DEVELOPMENT. SHOWING OF LINES MANUFACTURED.

A second bulletin issued by the Department of Census and Statistics at Ottawa, shows the values of individual lines of manufacture in this country. The figures illustrate the prosperous condition of affairs generally in the realm of manufacture. Increases in value as given before are from $481,053,375 in 1901 to $715,035,965 in 1906. Lines manufactured in 1906 that were not made in Canada five years previous or for which no previous returns had been made, include aluminum and aluminum ware, asbestos, axle grease, blankets and sweat pads, brass and iron beds, carbide of calcium, cement blocks and tiles, chewing gum, cake, combs, confectioners' supplies, enamelware, featherbone, furs dressed, incubators, patterns plaster and stucco, regalias and society emblems, show cases, silk and silk goods, skates, spinning wheels, stamps, and stencils, stove polish, tallow refined, thread and typewriter supplies. One of the greatest percentage increases was in electric light and power, being from $2,008,017 to $7,587,899 while electrical apparatus and supplies follow closely with an increase of from $3,032,252 to $8,996,906. A few lines show a decrease, the most notable of which is in the woolen industry. The greatest aggregate output was in log products, the increase being from $50,805,084 to $68,229,920. The greatest aggregate increase is found in the flouring and gristmilling products, which amounted to twenty-five million dollars more in 1906 than in 1901. The smelting industry increased from seven millions to twenty eight and a half millions, an increase of over three hundred per cent. Foundry and machine shops make a very creditable showing advancing in value from $15,292,445 to $24,013,094. Given in individual items the showing is:

	1901.	1906.
Canada	$481,053,375	$715,035,965
Abrasive goods	121,313	253,070
Aerated and mineral waters	806,532	2,227,274
Agricultural implements	9,597,389	12,755,748
Aluminum and aluminum ware		815,993
Artificial feathers and flowers	36,000	26,500
Artificial limbs and trusses	27,847	97,491
Asbestos	.....	1,533,819
Awnings, tents and sails	448,249	911,103
Axes and tools	1,038,705	2,775,851
Axle grease	.....	30,700
Bags, cotton	1,114,213	.....
Baking powder and flavoring extracts	524,016	1,474,252
Baskets	152,842	223,807
Batting	110,981	.....
Belting and hose, leather	408,715	939,312
Bicycles	550,606	335,425
Bicycle repairs	36,200	33,060
Billiard tables and materials	91,793	234,600
Blacking	128,217	188,463
Blacksmithing	77,594	431,199
Blankets and sweat pads	.....	$218,000
Boats and canoes	$143,832	294,878
Boilers and engines	4,626,214	3,473,899
Boots and shoes	18,481,216	20,264,686
Boot and shoe supplies	262,127	552,802
Boxes and bags, paper	1,256,147	1,892,511
Boxes, cigar	283,000	206,726
Boxes, wooden	1,927,720	1,669,483
Brass and iron beds	.....	1,094,077
Brass castings	1,099,557	1,144,756
Bread, biscuits, and confectionery	11,637,808	16,992,605
Brick, tile and pottery	3,299,917	4,774,305
Bridges, iron and steel	1,693,000	3,709,092
Brooms and brushes	952,658	1,144,803
Butter and cheese	29,462,402	32,344,513
Buttons	150,000	83,000
Carbide of Calcium	.....	234,700
Cardboard	147,000	320,896
Carpets	633,192	910,340
Car repairs	7,516,644	11,442,607
Carriages and wagons	6,650,912	8,347,509
Carriage and wagon materials	1,269,271	1,682,487
Cars and car works	3,951,172	14,430,190
Cement blocks and tiles	.....	407,587
Cement, Portland	765,876	2,166,002
Chewing gum		576,938
Church decorations	40,941	205,300
Clothing, men's custom	8,775,139	6,996,926
Clothing, men's factory	8,980,291	12,383,311
Clothing, women's, custom	4,368,580	3,514,994
Clothing, women's, factory	2,190,627	9,629,567
Cocoa and chocolate	218,160	323,199
Coffee and spices	1,957,536	2,204,967
Coffins and caskets	683,177	799,302
Coke	.....	1,279,259
Combs	.....	88,600
Condensed milk	269,520	855,409
Confectioners' supplies	.....	100,252
Cooperage	867,796	1,855,632
Cordage, rope and twine	2,212,663	2,756,147
Corks	176,172	195,516
Corsets and supplies	592,341	1,029,912
Cottons	12,033,052	14,223,447
Cutlery and edge tools	257,275	146,200
Dies and moulds	33,600	109,702
Drugs	1,380,905	2,893,321
Dyeing and cleaning	163,895	483,295
Electrical apparatus and supplies	3,032,252	8,996,906
Electric light and power	2,008,017	7,587,899
Elevators	207,100	682,800
Enamelware	.....	364,822
Evaporated fruits and vegetables	395,540	823,199
Explosives	543,944	498,328
Fancy goods	217,514	184,000
Featherbone	.....	$428,959
Fertilizers	$101,520	272,676
Fish, preserved	8,025,630	7,923,664
Flax, dressed	338,176	241,932
Flouring and grist mill products	31,835,873	56,703,289
Foundry and machine shop products	15,292,445	24,013,094
Fringes, cords and tassels	126,311	188,600
Fruit and vegetable canning	2,831,742	3,598,900
Furs, dressed	.....	1,970,190
Furnishing goods, men's	4,623,652	4,966,267
Furniture and upholstered goods	6,949,384	8,898,334
Gas, lighting and heating	2,327,466	2,193,996
Gas machines	79,121	97,869
Glass	995,401	1,421,773
Glass, stained, cut and ornamental	88,600	209,026
Gloves and mittens	1,024,245	2,423,584
Glue	47,627	370,302
Grindstones and pulpstones	41,400	68,504
Hairwork	109,679	256,719
Hardware, carriage and saddlery	401,921	870,542
Harness and saddlery	3,427,255	4,800,555
Hats, caps and furs	5,876,467	9,026,020
Hosiery and knit goods	3,857,519	6,682,195
Incubators	.....	51,226
Ink	105,000	217,982
Interior decorations	226,130	540,296
Iron and steel products	6,912,457	9,881,385
Jewelry cases	46,500	85,862
Jewelry and repairs	996,313	2,356,710
Ladders	16,300	.....
Lamps	117,491	68,648
Lasts and pegs	132,506	104,687
Lead bar and pipe	293,216	.....
Leather goods	72,600	432,435
Leather, tanned, curried and finished	12,068,600	15,142,217
Lime	523,862	1,139,416
Liquors, distilled	1,620,418	2,343,683
Liquors, malt	6,204,250	8,569,789
Liquors, vinous	289,350	316,612
Lock and gunsmithing	95,150	210,345
Log products	50,805,084	68,229,920
Lumber products	10,754,959	20,128,295
Malt	271,150	936,961
Matches	312,655	226,743
Mats and rugs	52,092	72,003
Mattresses and spring beds	672,850	823,819
Metallic roofing and flooring	495,500	824,206
Mica, cut	337,628	197,234
Mirrors and plate glass	265,535	458,789
Monuments and tombstones	935,678	1,647,488
Musical instruments	3,023,730	3,689,205
Musical instrument materials	356,997	530,231
Oils	3,519,493	4,519,929
Oil clothing	560,693	948,538
Optical goods	199,750	178,094
Painting and glazing	103,000	182,641

	1901,	1906.
Paints and varnishes	$2,786,593	$3,779,181
Paper	4,380,776	9,118,870
Patent medicines	1,350,993	1,697,898
Patterns	.....	74,316
Photographic materials	230,186	608,842
Photography	94,858	40,819
Picture frames	623,025	605,504
Pipe and boiler covering	68,915	62,795
Plaster	88,706	48,700
Plaster and stucco	.....	14,800
Plumbers' supplies	821,584	2,885,183
Plumbing and tinsmithing	6,553,957	11,406,671
Printing and bookbinding	2,748,356	6,820,123
Printing and publishing	10,319,241	13,011,604
Printing presses	362,135	191,249
Pulleys	248,000	.....
Pumps and windmills	733,150	832,165
Railway supplies	556,600	983,000
Refrigerators	149,974	283,000
Regalias and society emblems	.....	59,200
Roofing and roofing materials	569,640	1,326,434
Rubber clothing	401,000	725,800
Rubber and elastic goods	1,173,422	2,335,358
Safes and vaults	225,200	339,500
Salt	345,148	441,725
Saws	314,312	401,979
Scales	285,240	327,155
Screws	385,810	.....
Seed cleaning and preparing	1,472,087	2,001,346
Sewing machines	752,308	501,550
Ships and ship repairs	1,899,836	1,648,317
Shoddy	155,280	266,577
Shooks, box	293,225	530,600
Show cases	.....	345,631
Signs	34,160	132,470
Silk and silk goods	.....	955,705
Silversmithing	740,969	946,275
Skates	.....	19,800
Slaughtering and meat packing	22,217,984	27,220,363
Slaughtering, not including meat packing	.....	1,862,263
Smelting	7,082,384	28,426,328
Soap	2,143,915	3,000,821
Spinning wheels	.....	4,900
Stamps and stencils	.....	110,483
Starch	1,006,400	1,228,250
Stationery goods	638,520	847,282
Stereotyping and electrotyping	90,034	103,389
Stone, cut	72,700	1,278,780
Stove polish	.....	36,580
Sugar, refined	12,595,000	18,268,260
Tallow, refined	.....	270,370
Textiles, dyeing and finishing	2,051,992	2,264,207
Thread	.....	1,034,000
Tobacco, chewing, smoking and snuff	6,469,961	6,453,100
Tobacco, cigars and cigarettes	5,332,151	8,791,943
Typewriter supplies	.....	48,000
Umbrellas	110,000	252,000
Vinegar and pickles	561,682	583,193
Wall paper	874,049	1,023,000
Washing compounds	20,500	30,500
Washing machines and wringers	$179,434	$252,052
Watch cases	707,840	332,100
Wax candles	71,250	65,100
Window blinds and shades	738,532	968,600
Wire	1,693,995	3,934,484
Wire Fencing	336,470	1,286,549
Woodenware	.....	472,295
Wood pulp, chemical and mechanical	4,246,781	4,579,103
Woodworking and turning	777,722	786,697
Wool, carding and fulling	4,030	73,847
Woolen goods	7,359,541	5,764,600
Wool pulling	115,487	600,442
Woolen yarns	86,350	156,000
All other industries.	8,447,130	7,333,903

NOTE.—Factories or works producing more than one kind of industry are classed with the kind showing the largest production, where the value of each kind is not given separately in the return, and therefore, the statistics in some cases are not fairly comparable for the two years. This has occurred with wood pulp, whose value in one large works has been added to values of paper; and also with boilers and engines, whose values have in several instances been given with foundry and machine shop products. In every case where less than three works of a kind have made returns, the values have been put under the head of all other industries. The statistics in the table are now complete for all but ten factories or works in the Dominion, and it is hoped that the returns for these will be received before the final report goes to press.

Industrial Welland.

The assessor's roll of the town of Welland shows that in a year the total assessment has grown from a round million to $1,900,000, an increase of 90 per cent., and the population from 1,886 to 3,272, an increase of over 70 per cent.

Welland, Ontario, is to have two additional new industries before the summer has passed, each to employ over 600 men. These will be the largest industries that have yet come to Welland, but pending final arrangements, fuller details are not yet available.

M. Beatty & Sons, Welland, Ont., are located in thier fine new plant of concrete and steel construction. With additional machinery and equipment they are in a position to turn out a much larger output. Already work has commenced on the erection of an addition to the boiler shop. The entire machinery will be run by electricity.

Since the destruction of their plant by fire, the Robertson Machinery Co., of Welland, Ont., have occupied the lately vacated Beatty plant. At a meeting of the directors held on Monday, June 11, it was decided to go ahead at once with the building of a new plant. The main building will be of concrete, 150 x 75 feet, with machine shop 75 x 45 feet and foundry 60 x 50 feet.

Electric Metals, Limited, of Welland, Ont., whose engineer, Mr. J. L. Wilson, is on the ground and making arrangements for the erection of the buildings for a new plant. It will be situated on the Welland Canal, south of the Ontario Iron and Steel plant. It is intended to commence the erection of the buildings within a few weeks. This will be the first plant built in America to apply commercially Dr. Haanel's classic experiments and researches along the line of smelting ore by electricty.

The Supreme Heating Co., of Welland, Ont., commenced the building of their new factory on June 6, work on which is being rapidly proceeded with. The main building is 202 x 44 feet, with a foundry adjoining 70 x 45 feet. It is expected to commence operations in the new plant by August 1, when 100 men will be employed A special type of economical cooking range will be the main line of manufacture. But other heating apparatus will be included Hon. A. G. McKay, of Owen Sound, is president, and S. J. Parkes of the same place secretary treasurer. They expect to have some of their lines in readiness for an exhibit at the Toronto Exhibition.

THE STEEL PLANT.

A number of the directors of the Ontario Iron & Steel Co., including President Wear, visited the new works on June 11. The buildings are now all erected and a large part of the machinery and equipment installed The plant has been constructed under the direction of Mr. Robert Porter, who is a well qualified steel expert and who will assume the general managership of the company The whole plant will be running in full swing within a few weeks.

CANADIAN BILLINGS & SPENCER

The Canada Forge Co. have been manufacturing since February of this year, where they are turning out iron and steel forgings, both rough and finished, ranging from five pounds to five tons. A large number of orders for forgings of all kinds have been received which will keep the plant busy for some time to come under the skilful management of Mr. T. J. Dillon.

On April 15 the Canadian Billings & Spencer Co, under the management of Mr. J. Gill Gardner, commenced the erection of their new plant which is expected to be completed in the fall. The buildings are of steel and reinforced concrete, and include a forge shop, a machine shop, transformer house and office, which are being built by the Provincial Construction Co., of Toronto Sidings have been built connecting with the G.T.R. and Wabash lines by means of which nearly all the materials of construction were brought to the grounds. A 200 k.w. transformer has been installed, it being the intention to run the entire machinery by electricity. Temporary ends are being adopted in the different buildings to allow of further expansion. All kinds of drop forgings will be made such as are now manufactured by Billings & Spencer, of Hartford, Conn., which include machine wrenches, automobile forgings, crank shafts and machinery parts.

An English schoolboy who had to write something upon the abdication of James II., handed up this to the examiner: "The Abdicasion of James II.—The english people had born a grate deel from James 2nd but when at last he gave birth to a son they said this thing must end."

Doing a Good Work.

AN ASSOCIATION OF EDUCATION AND PROGRESS SHOULD HAVE THE SUPPORT OF EVERY MANUFACTURER INTERESTED IN METALS. AMERICAN FOUNDRYMEN'S ASSOCIATION CONVENTION MEETS IN TORONTO NEXT YEAR.

When an organization has for its object the education of its members, the free exchange of ideas, the standardization of materials, and in general the placing of the industry it represents on a higher and more efficient plane, it deserves success. Such is the object of the American Foundrymen's Association, and it has been successful. During the eleven years of its existence its history has been one of progress. Next year the Association intends holding its convention in Toronto, which will be attended by about 2,000 delegates and at the same time the Foundry Supply Association will hold its annual exhibition of the latest machinery and apparatus dealing with foundry practice. Part of the address of the retiring president, W. H. McFadden, given at the recent convention at Philadelphia, deals with the advancement in foundry science. He tells of their early experiments on the effects of silicon on iron. Its influences were studied and the results explained at these meetings.

Differences of opinion were frequently manifested, but the knowledge gained proved of great benefit to foundrymen. Experiments and discussions soon brought out the fact that silicon was but one of several elements which exerted a marked influence on cast iron. This led to a study of the effects of other impurities, and has resulted in the development of foundry metallurgy into an exact science.

There is no longer any excuse for the uncertain hit or miss methods formerly used for in mixing foundry iron. Our proceedings contain material, which, if intelligently applied, should allow the foundryman to shake off the shackles which bind him to the ruts followed by his forefathers.

It is a surprise to me that the opportunities offered by metallurgy are not more universally taken advantage of, as the foundry metallurgist has explained many of the problems formerly thought unsolvable. Where metallurgy is not a success in a foundry, it is due to the lack of knowledge of the one who seeks to apply it rather than to any defect in our present knowledge of the science itself.

STANDARDIZED DRILLINGS.

In order to aid the foundry chemist to obtain uniform results, this association developed a series of standardized drillings of cast iron which have become the arbitrator in nearly every laboratory in America. While these drillings are now under the Bureau of Tests of the United States government, their inception and preparation resounds greatly to the credit of our association.

STANDARD METHODS FOR ANALYSIS.

Hand in hand with the work of standardized drillings has gone the work of standard methods for analysis of iron. Started some years ago, the work has since been in the hands of our metallurgists. After four years of hard and painstaking labor, their committee has at last succeeded in placing before our association a series of standard methods. Their adoption, for use in cases of dispute, will greatly aid in preventing dissension between the buyers and sellers of pig iron. The secretary and committee have worked arduously for the association and deserve great credit for their results.

STANDARD METHODS FOR TESTING CAST IRON.

The work of this association formed the basis for the standard methods for testing cast iron adopted by the American Society for Testing Materials. The data published in connection with this work, in our proceedings, is of itself an encyclopedia on cast iron, giving, as it does, the analysis as well as the strength of a large number of characteristic irons. It is to be regretted that these specifications have not met with more universal usage; it is possible that they do not fulfill the requirements of founders and, if this is so, steps should be taken to remedy the defects. Cast iron will maintain its position in the future solely by the intelligent application of some method of testing, which will give the engineer an accurate knowledge of its strength in the casting as it makes up a component part of the machine.

STANDARD METHODS OF BUYING PIG IRON.

The work of the association in bringing about the adoption of standard specifications for buying pig iron deserves mention. The old method of buying by fracture is rapidly disappearing and the modern method of buying by analysis is rapidly taking its place, much to the advantage of both the buyer and the seller. This happy condition of affairs is largely due to the work of this association and the publicity given the matter by its proceedings.

STANDARD METHODS OF FOUNDRY COST KEEPING.

Another matter which deserves the careful attention of every foundryman, viz., methods for keeping foundry costs. All foundries have some method, however crude, for ascertaining costs of castings. A careful study of these methods reveal the fact that many of them are not only incomplete, but very misleading. The association should assist in the development of some simple system which will give accurate costs. This should be a foundation, as it were, on which those foundries desiring to go into detail could build and still preserve the principles of the standard method.

Some system is essential to remedy the uneconomical working conditions which exist in our jobbing foundries. Some method should be adopted for properly distributing the general expense or burden of a plant so as to enable the foundryman to ascertain just what class of work was profitable for him to make and what should be left for some other to handle. An intelligent system would lead to a rearrangement in bidding on work which would cause a much improved condition in our jobbing foundries.

This illustrates the nature of the work being carried on by the National Foundrymen's Association, and as such its influence is felt not only in the foundry, but indirectly in every branch of manufacture.

CONVENTION IN CANADA.

That the convention will be held in Toronto next year is due in a large measure to the efforts of Mr. L. L. Anthes, superintendent of the Toronto Foundry Co., Toronto and vice-president for Canada of the National Foundrymen's Association, who has worked diligently with this in view. Mr. Anthes has taken a close interest in the work of the association, being an aggressive and influential member, being rewarded in his work by arranging, not without some opposition, to have the next convention held in his native city. Objection was raised by some members of the Supply Association that trouble would be experienced with our customs regulations

L. L. ANTHES, SUPERINTENDENT TORONTO FOUNDRY CO., TORONTO.

in bringing their exhibits, but Mr. Anthes was able to assure them, having taken the precaution of ascertaining beforehand, that the Canadian Government would contribute the building used for the exhibits, a bonded warehouse. It is proposed should nothing intervene to prevent, to have the convention held in two separate buildings of the Toronto exhibition, enabling the meetings where papers are read and discussed and business transacted to be free from the noise of moving machinery exhibits.

It is opportune here to say a few words regarding Mr. Anthes toward whom Canadian foundrymen and many manufacturers feel a sense of gratitude at the present time. As a technical graduate and university man he has had a broad training for the position he now holds. As a practical foundry man, however, he excels, having been one of the first to develop the gravity method of moulding which is coming into more and more general use, on account of the economy, speed and precision made possible. His paper read before the New York convention three years ago caused considerable attention, and has led to a wider development along this line. The foundry of the Toronto Foundry Co., is a further tribute to the ability of Mr. Anthes, being considered a model and visited by many in search of the latest ideas in foundry practice and construction. Here moulding is done by gravity and there may be seen working the only duplex gravity core machine in the world, the design and invention of Mr. Anthes.

Foundry Design and Construction.*

By Geo. K. Hooper, New York.

The foundry business has become so specialized and such rapid strides have been made in the elementary knowledge of the methods and requirements of manufacture that it is difficult to make any general remarks on the subject of foundry construction. I will, however, endeavor to describe some of the plants which I have designed and which comprise foundries devoted to the casting of the smallest forms as well as large sections with practically no core work, to the most specialized shops using machines almost exclusively.

A Heavy Work Foundry.

For plants engaged in heavy work I have made designs in two ways. In one instance, owing to the form of the site and the location of the railroad tracks, it was found advisable to place the stock house and melting equipment at one end of the foundry, permitting all the other operations to develop from that point as a basis. For this shop a straight open building, three bays in width, was designed, the second bay having been provided with cranes of sufficient capacity to handle the larges ladles as in this case the work was such that the ladle of iron was the heaviest thing to be handled. Single rail electric travelers were also installed in the main and side bays provided with suitable wedges to facilitate their movement from one department to another. In addition to serving the foundry these trolleys were used for cleaning up and for conveying scrap, sprues, gates, etc., from the foundry to the stock house.

The melting equipment was in the middle of one end of the foundry and was separated from it by a brick wall. The spouts of the cupolas projected through the latter and were adjustable, so that large or small ladles could be filled at any distance from the furnace. The brick wall also kept the slag fumes out of the foundry, and the drop was likewise confined, which made the work of cleaning up comparatively easy. The cored and small work was done close to the cupolas, while the large work, on which the temperature of the iron could vary considerably without affecting the castings, was placed where most convenient. It is unnecessary to state that such work as required the use of cranes was done in the middle bay.

Cleaning Department.

The cleaning department was located at the end of the building opposite the cupolas, partly in the centre and partly in the side bays, the design being such that as the foundry increased its output the building could be increased in length and the cleaning equipment moved along to provide additional moulding space. With the growth of the plant in view mills, grinders and the sand blast machine were placed as far down as possible, that they need not be moved until the second extension to the foundry was made. The counter on the site was such that the waste material could be moved out of the side and end of the shop for filling purposes.

Owing to the peculiar location of the railroad tracks, the stock house was placed across one end of the building and the track was extended up to the charging floor, making it possible to unload several carloads of coke and iron onto this floor. The space underneath the trolley was utilized for the storage of iron, coke sand, fluxing material, etc., and the whole was inclosed by a like building, which contained a single rail electric traveller for handling material to the cupolas and the foundry, and which connected with the trolleys in the latter.

The Main Building.

The main building was of steel frame construction with brick curtain walls, and was provided with a wooden roof covered with slag roofing and with large wooden frame sliding sash windows. The floor of the foundry consisted of moulding sand laid on filling, although no pit work was done. Ventilators with tilting sash operated from the floor extended practically the width of the center bay, and while there were no skylights, sidelights were depended upon for all of the illumination, the windows having been carried as high as possible for this purpose. Large galvanized iron ventilators were placed in the roof at every other bay, to provide for the circulation of air when not pouring and in inclement weather.

The foundry was about 350 feet long, and if it were increased in size to make other melting equipment necessary the cupolas would be installed at one side sufficiently far down conveniently to distribute the iron according to the varying classes of work to be poured. It is not probable, however, that this will be done, as there seems to be no reasonable limit to the distance which a ladle of iron for heavy work can be carried.

A Foundry for Machinery Castings.

A foundry of another type for the production of medium and large machinery castings, with a fair proportion of cored work, was laid out partly in accordance with the contour of the site on which it was located, due regard being given to the location of the railroad tracks. This foundry was of the usual three bay type, having one large centre bay and two smaller ones on either side. The stock house was placed at one side of the property adjacent to the railroad track and contained all of the raw materials except the iron, which was carried in the yard commanded by a crane. The stock house has an elevated track extending through it, that all supplies could be dumped by gravity from the cars in which they were received and thereafter conveyed under cover into the foundry. This stock house need not darken the side of the foundry which it adjoins, since it can be located far enough away to permit the placing of windows down to a level about seven feet above the floor, with a light well at least 12 feet wide. In any event it makes little difference whether the light is somewhat obstructed on that side, since the melting equipment occupies some of it, and with a foundry for this class of work there are core ovens, drying ovens, sand mixers, core storage, core-making and other departments, which do not require much light, while others can be suitably lighted by skylights.

Conveying Appliances.

The coke is raised to the charging floors on cars by means of a plunger elevator, while the iron from the stock yard is carried by a single rail traveller directly to the charging floor.

Both the melting and cleaning departments are fixed points in this scheme, the foundry with its stock house and yard growing away from these departments, and additional melting equipment can be placed in the side bay if required.

Cleaned castings are stored in a yard or building at right angles to the foundry, communicating with the machine shops. As there is considerable core work a large amount of refuse has to be elevated by cheaply built conveyors to a set of overhead bins, discharging into cars or wagons.

Since a foundry of this type will have some pit work the flooring will naturally consist of sand to a considerable depth, with brick or concrete floors in the cleaning department. The cleaning floor space will absorb some of the molding room as the foundry is extended, but otherwise this department will not be disturbed.

This type of plant presupposes a large establishment, divided into departments, castings being made at the option of the foundry rather than in response to some demand from the machine shop. This plant is to be built with masonry walls, having a wooden roof covered with slag or gravel, wooden window sash, partly sliding and partly tilting, large monitor with tilting sash, galvanized ventilators, coreroom partitions fireproof, and with floors in front of the drying ovens and the coreroom of concrete construction.

A Foundry for Chilled Castings.

Another type covering several classes of large work is designed to grow in two directions, being devoted to a large amount of chilled work. The melting equipment, including air furnaces, is located in the centre of the building, and the space immediately in front is occupied by the ladle and chill storage and ladle mending departments. Inasmuch as the moulds for the sections made in this plant are cast on end a proportionately greater tonnage can be secured from a limited floor space, as compared with a plant where floor moulding is done exclusively. Considerable room is required in a shop of this kind for handling ladles. Separate power cranes are also required for each pit, and liberal head room is necessary. The floor about the pits in front of the drying ovens should be made of concrete. The growth of the other end of the plant devoted to the production of general castings will be similar to that of the large foundry already described.

Arrangement of the Plant.

A plant of this kind may be divided into three or more bays, the furnaces being so located that they are accessible to the main bay cranes. The stockhouse and iron storage may be located as previously explained

*Paper read at the annual convention of the American Foundrymen's Association, Philadelphia, Pa., May 21-23, 1907.

The charging floor, on account of the cupolas necessary to supply all of the mixtures required, should be served by an overhead crane, which can carry large pieces of scrap and carloads of pig iron to any cupola or furnace.

While the area required per moulder in lighter gray ironwork may be as great as in heavier work, or even greater, the tonnage handled is proportionately much smaller. Frequently no overhead equipment is required, tracks or trucks being amply sufficient for handling the iron. Certain floors may require comparatively large amounts of iron and separate handling appliances, but in general the buildings will be divided into bays, with the melting done at one end or one side, and the cleaning department directly opposite. The pickling department should be located away from the natural line of growth, so that extensions will not disturb this department. For this class of work the core room can be established at a distance from the foundry, and it is not essential to have it directly in or adjacent to the foundry building.

The stock sheds and iron storage should, of course, be convenient to the melting department, and the overhead crane is not essential to the iron yard. Tracks and cars connecting with the elevator are as economical as a yard crane, when all of the handling is considered. A separate building should also be provided for the storage and repair of moulding machines.

In a foundry of this type it will be found necessary to install light overhead travellers, which can serve either the moulders or the machines, and which in any event can handle the iron. Considerable space is also necessary in a plant of this kind for stacking flasks, as it is not practical to have a large flask yard or to build a separate structure for them. Galleries can be used very well as storage room.

Plants Equipped for Special Work.

Foundries equipped with machines for special work will next be considered. They can be built several stories in height, with a foundry on the upper floor and the other departments underneath, or where there are a number of foundries in a group the buildings should be two stories, with the foundry on the top floor. The various foundry buildings should be located so as to conveniently receive their supplies from one stock house and their cores from another, with a pattern storage and repair department over one or the other of these buildings. The buildings should be designed with sufficient head room in the lower story to accommodate large tumbling mills, with a platform over them for suitably distributing stock, the mills being high enough to dump their contents either into barrels or onto conveyers. A floor should also be provided for the foundry, with a frame for a suitable grating, through which the sand can be dropped and on which castings can be piled after shaking out.

The roof should have sufficient strength to support travellers for carrying the moulds and iron, and all bracing should be kept above the trusses, as far as possible, to provide for conveyers for handling sand to the moulding machine hoppers. The trusses should be designed with a stiff lower chord, and should be of such form that the apparatus may be fastened to it anywhere without punching or drilling. A durable floor can be made of paving brick laid on planks, with a cushion of sand, the planks having previously been covered with a waterproof material to prevent dry rot. A floor of this kind can be changed for any purpose more easily than one of steel or concrete, and is furthermore much lower in first cost.

The castings are dropped through chutes in the floor to the mills below, where the sorting, cleaning and grinding are done, although a certain amount of sorting can be done on the foundry floor by judiciously locating the machines on similar work.

Specialty Foundries.

Plants for highly specialized work, involving carriers for handling moulds, flasks, castings, etc., will next be considered. There are two types, one with the building two or more stories in height, with a carrier on the upper floor, while the other has the carrier and the other departments on the ground floor. The price of the real estate and the size of the cores largely govern the design of a plant of this kind, as the output is large in volume and must be handled by conveyers, and there is little advantage in the use of gravity.

I have built plants of both types and have found either well suited for the work for which it was planned. In one case the core-room and core storage were located so that the cores for all classes of work could be placed on the carrier with a minimum amount of handling, and each car of the carrier brought a fresh core to replace the one taken away. All departments, including the cleaning room, were on the ground level. Such a plant requires a large amount of light and ventilation, and windows and skylights are placed wherever possible. The floors are preferably of concrete, as practically no sand collects upon them, and as the pouring is done while the flasks are in motion on the carrier there is little danger of spilling or splashing iron. In another plant producing very small castings the carrier was placed on the second floor, and the finished sections were delivered by means of a conveyor through a separator and cooling tank to a continuous cleaning apparatus on the first floor. The cores were handled in trays.

The roof of such a foundry should be very heavy and substantially braced in all directions, as it must support considerable overhead conveying apparatus for the handling of sand, with concentrated loads at various points where the sand happens to be located. The floor should be of brick or concrete, preferably the former, for reasons which I have already given. There are no great floor loads with carriers, but a complicated flooring system is usually necessary on account of many conveying devices which are used.

Wall Construction.

In the construction of buildings brick walls, either with or without steel columns for supporting the trusses, have been used. There are other forms of wall construction from which choice can be made, such as reinforced concrete, concrete plaster on wire lathe, concrete blocks, terra cotta hollow blocks with or without steel reinforcing strips, brick, corrugated iron and wood. The last two are rarely used at present, wood being objectionable on account of the fire risk, and corrugated iron in view of its short life. Of the other materials the question of relative cost is a large factor, and a suitable selection must be made to fit the case in hand.

Objections to Concrete.

I have always presented plans of all my buildings to the reinforced concrete contractors, that they might compete with the other forms of construction, but I have not yet been able to secure a bid or to have a building built as cheaply by them as from other materials, and when I say this I accord due appreciation to the question of insurance, as locality and contents are considered by the underwriters, as well as the type of the building.

I am somewhat opposed to reinforced concrete on account of its lack of what I term "manufacturing elasticity," since it does not adapt itself very well to alterations and extensions which are constantly being made in plants devoted to foundry work. Brick, concrete blocks and hollow tile are the most adaptable, brick probably being more so than any of the others. Considering the present price of brick, no saving can be effected by the use of the other two forms of covering, although in the large foundries to which I refer the weight of the steel can be maintained at the minimum by the use of hollow tile above the windows.

For interior partitions hollow tile makes a firm, cheap wall. Concrete plaster on wire lathe, expanded metal, or galvanized netting usually requires so much supporting steel that it is quite expensive and practically costs more than brick and does not possess the advantages of the latter.

Roofs.

Steel roof trusses should be carefully designed so that they may be conveniently reached with cleaning and paint brushes, especially in foundries of the continuous type, where considerable vapor arises from the cooling sand. The trusses and columns should be carefully and thoroughly painted. Roofs are cheaply constructed of wood, with slag or gravel covering. This covering is favored in view of its low first cost, as against slate, tile and special forms of reinforced concrete. I have had only one disastrous experience with a roof of this kind, and that was due to the fact that the sprinkler system had not yet been connected.

Windows, Skylights and Floors.

Windows, except where there is an exposure, are generally made with wooden frames, glazed with factory ribbed glass, and should be fitted to tilt, thereby securing the greatest possible opening. There was at one time a craze for making walls almost entirely of glass and steel. These buildings, however, are difficult to heat in winter and to ventilate in summer, while the glare of the direct sunlight is most unpleasant. Many plants of this kind have adjusted curtains to the windows and have glazed portions of the windows and in some cases large sections have been removed.

A building wall containing 50 per cent. of window space will usually be very completely lighted for any width of structure and in any event passages and storage departments can be placed in the darker sections.

I am an advocate of metallic bars and ribbed glass for skylights, and in continuous foundries where a large amount of vapor is present a copper bar is cheapest in the end.

All of the floors I have described have been used successfully, but there is one type that I have not referred to and which is built of

ordinary brick, with rails laid thereon, over which the flasks of the machines can be moved as the case may require. The rails should be laid down on sleepers in a sub-base of concrete, if this floor is on the ground level. The floors of the charging departments should be made of steel plates without tracks, or, in fact, any ridges of any kind to interfere with the free movement of trucks and the use of shovels or forks.

Cupolas.

The cupolas should be set fairly high so that a man may work conveniently under them and to facilitate also the handling of ladles of various sizes. This is especially a desirable feature for continuous foundries where a ladle reservoir is provided with a skimming device which is located between the cupola and the pouring ladle.

The charging door I usually make very large, with a heavy cast iron curb, that a truck of scrap or coke may be run right up to it and dumped in. The opening is best protected by a wire screen raised and lowered by counterweights. The installation of spark deflectors depends somewhat on the location.

I sincerely hope that some one will soon devise a practical cupola blast regulator. I have some ideas on the subject myself, but have been too busy to develop them.

Depending on the work, I advise from 11 to 14 feet above the tuyeres as the proper height of the opening in the cupola for economical and rapid melting. After considerable experience with tuyeres of various types, I still adhere to the old-fashioned square box tuyere as being the most reliable and efficient. Blowers vary in accordance with the service they are to render, my preference being for a positive blast blower for cupola work, with independent engine or motor, as circumstances may dictate. The motor should be provided with a speed regulator to control the melting, the latter being imperative for continous practice. For air furnaces the centrifugal blower seems to be best adapted, a simple unloading device being sufficient for its regulation. It is, of course, needless to say that the larger the fan within reasonable limits, the smaller the consumption of power.

I also advocate the slagging of the iron as the melting proceeds, and the tonnage of the heats will naturally indicate whether or not a special conveying apparatus should be used for handling this slag. A wheelbarrow is, of course, the simplest device.

Raw Materials.

The coke should be kept under cover, and handled as little as possible. Scrap should be handled according to its nature, as no single method will answer for all grades, although the magnet seems to be more adaptable than any other method. A system of handling pig iron will depend upon the amount consumed. Small quantities for small cupolas which must be broken can be handled more cheaply by common labor, while large tonnages offer a prolific field for the use of a magnet and adds considerably to the storage space. I have yet to be convinced of the value of a cupola charging machine. Storage yards for charging materials should be served by an overhead crane and industrial tracks should be used as little as possible.

Plunger elevators are best adapted for charging floor service. Whether the machine should operate directly by hydraulic pressure or with some elastic medium interposed between the water and the source of power will depend largely upon conditions. In large foundries, and especially for continuous work, I usually provide a speaking tube between the melter and charging floor that the chargers may supply coke in accordance with the demand for iron from the floor. From this you can see that the melting ratio is of comparatively little importance in this work, when compared with the cost of a completed mould. Frequently the core alone costs several times more than the coke employed in melting the iron.

Cranes and Conveyors.

For handling large flasks I prefer a locomotive crane, as it gives the greatest flexibility with the least expense. The practice of running an overhead crane through an opening in the end of the building is very expensive and unsatisfactory, requiring as it does expensive building construction. It is furthermore impossible to keep tight against the weather while the flask yard is limited to the space directly in line with the crane runway and generally in line with and obstructing the growth of the foundry. By the use of the locomotive crane a site of any shape can be utilized and the crane can enter the foundry at almost any point. As it is operated by steam, it can be driven independently of the plant. For indoor flask storage, trucks and elevators provide suitable and convenient means for handling.

Belts of a liberal size with bucket elevators are best adapted for handling sand when it is to be delivered to the various parts of the foundry mechanically. Belts may safely be used for receiving hot sand dumped out of flasks, though containing many sprues, much shot and chaplets. Belts also may be used for handling flasks in continuous work even though they are hot and of considerable weight. I also advocate sand riddles, with bronze wire, as it lasts longer than iron, steel or brass. Wood or reinforced concrete is the best material for sand hoppers, conveyor troughs, etc., while all the advantages are in favor of wood.

In designing continous systems, whether wholly or partly automatic, care should be taken to keep the various operations independent of each other, that any interruption to any one may not affect the others. The efficiency of this method of producing castings depends largely on the care given to this feature. I have known of some who have failed entirely as a result of the too close adjustment of the various operations, whereas a little room between them would have made the plant a success.

When cranes and tracks are used, care should be taken to prevent points of congestion at meeting or transfer places.

Core Rooms.

Core rooms naturally depend on the nature of the work. For large and intricate work they should be located in the foundry, while others can be placed in separate buildings and can deliver the cores to the foundry on conveyors and can later be distributed by boys. For making cores of moderate size to be handled in dryers, I advocate that the benches should be so spaced that the oven cars can operate between them, permitting the finished cores to be placed directly on the cars and when filled they can be run directly to the ovens over suitable tracks. After the cores are baked the cars can be delivered to the core storage room, thus obviating unnecessary handling.

For cores of large or moderate size I prefer an oven which has a long arch at the bottom with fire and combustion chambers underneath, and the heat thus radiated will circulate through every part of the chamber. For small cores I had devised an oven heated by oil or gas containing a conveyor. Learning later that the same could be patented owing to a previous right on a continuous baking machine, I lost interest in the same. A plant which I built has eight of these in operation, using oil in conjunction with waste heat from the malleable annealing ovens.

Evolution of the Foundry Business.

By Edw. B. Gilmour, Elizabethtown, Pa.*

In entering upon a discussion of the evolution of the foundry business it is unnecessary to dwell at any great length upon its early history as it was not until comparatively recent times that the foundry business was given any practical study. Everything cast was formerly made in brass, it being fusible and of a pretty appearance. As a consequence a very great variety of products were made of that metal, and we have records of some early castings that are almost beyond belief. If these castings were wanted to-day it is very questionable if any founder would care to run the risk of making them unless at a large margin, the customer assuming part of the risk.

Among these historical castings are the two columns cast by Hiram of Tire for King Solomon's temple. These were 27 feet long and 4 feet 6 inches in diameter, and weighed about 175 tons. It is also recorded that the Greeks and Romans were experts in the moulding of statuary, having had a circus adorned with no less than 3,000 statues of bronze for the time of the Circinsian games.

It was not until the seventeenth century that the casting of statuary was better known by us. Authorities agree that it was in the fourteenth century that the first gun was cast. As to bell founding, we have a record as far back as 400 A.D., of castings made at Nola in Campania. The largest bells have been cast in Russia. In 1736 there was one cast in Moscow weighing 250 tons, the largest in England is only 15½ tons, and the largest in this country is in Montreal and weighs about 13 tons. Milwaukee has one weighing 10 tons.

The art of bell founding is very simple as regards the moulding, and there has been no progress in this line. With the usual spindle and sweep, any desired shape and thickness can be secured. It was not until the beginning of the last century that the

*Read at Philadelphia Convention American Foundrymen's Association.

iron founder asserted himself, and it is only since the introduction of the steam engine that any real progress has been made in the foundry business. Now it has reached such a state of perfection that no matter how complicated the article, it can be made.

The introduction of the marine engine has stimulated great ingenuity in the production of heavy and intricate castings. I well remember that when a large cylinder was to be cast it was not uncommon to have it made over the third time before it was accepted; whereas at the present day it is as much as a moulder's reputation and position is worth to save a single blemish upon it. This is the advantage of specializing in the foundry.

Nevertheless it has been truly said that every foundryman should have some knowledge of chemistry; especially that related to his work. It is not so essential to know what an iron contains as it is to know how to utilize the different constituents to the best advantage in the various classes of work required. Theoretical knowledge is of very little value to the foundryman without the practical experience, as great care and watchfulness are required to insure success. The exactness of our art is unlike that of any other. One must follow regular laws, and one small variation will destroy all the work in one minute which may have taken weeks to produce. Very little has been done in the way of machinery for moulding, all the appliances simply being designed to help the skilled moulder whose mind has to be kept continually at work in order to keep up with the requirements.

While the engineer has been making rapid progress with the steam engine for transportation purposes, and has compelled the foundry to be based on science, the founder of specialties has not been behind in his endeavor to produce castings in quantity and of quality, and with the duplication of so many parts the ingenuity of the designer of moulding machines has had splendid results, increasing the output enormously and improving the quality. The moulding machine is now an indispensable factor in the foundry.

Since the introduction of metal into the patternshop there has been a tendency to do away with the regular gated patterns and to substitute aluminum and other metal webs which do away with sand matches and the breakage of gated patterns. The webs are practically indestructable, and when the patterns become obsolete, one has the value of the metal for other patterns.

While the designers of moulding machines have made rapid progress, they have never been satisfied with their work, and in consequence, at every convention, we have been surprised by something new in this line. We have had the indispensable stripping plate machine which produces a most perfect casting, but we must yet dispense with much of the hard work required in ramming moulds. Power rammers of various kinds have been adopted such as those working by steam, eccentric pressure, jolting, etc., which have been applied as a rule to special work. This year we have an innovation in the way of a moulding machine which I predict will extend the machine moulding business as the gravity principle has been applied in a new way. This system has been attracting considerable attention for the past three years in different sections of the country. Mr. Anthes, our vice-president for Canada, has made some valuable experiments along this line which have been very successful. At the same time in the far south and middle west other men, unknown to each other, were experimenting along the same line.

The method is taken from the fact that the most intricate kind of ramming is accomplished by riddling the sand at one side and throwing it into the intricate parts of the mould. For instance, a gear wheel can never be rammed successfully in the teeth with a rammer. This principle is now carried further and applied to every part of the mould in the form of a machine called the gravity moulder. One other good feature of this machine is that one can adopt a special flask the full size of the machine. We have adopted a standard size, 3 feet by 4 feet with a 5-inch cope depth and a similar drag with bars bolted in. One can put any number of sections together to get any required depth. With the stripping plate attachment good and rapid work can be done, the greatest difficulty being the handling of moulds as fast as the machine produces them.

This is the latest development in the art of moulding and is based on the successful application of the force of gravity. Most of the experiments have been based on the theory that the greater the distance the sand has to fall the harder it will pack in the flask. Experience has demonstrated, however, that the reverse is the case, and that the mere dropping of the sand into the flask does not serve to pack it, and the greater the distance it is allowed to fall the less it will pack by reason of the increased tendency to scatter or disintegrate while falling through the air.

The inventors of this machine discovered in their experiments that to successfully utilize the force of gravity, the essential requirements are first in forming separate, unitary bodies of sand of the proper size and shape and degree of firmness, and the discharging of these bodies from an elevation sufficient to cause them to pack together in the flask by the impact of the fall. When these separate bodies of sand are properly formed, it is only necessary to have the fall a comparatively short distance to accomplish the desired results.

It has been found in practice that to make successful the gravity method of moulding it is necessary:—

First—To form the sand into proper size and properly shaped bodies.

Second—To compress these bodies to a considerable degree of firmness before their discharge into the flask.

Third—To discharge a series of these compressed bodies into the flask from an elevation not great enough to cause the sand to disintegrate or scatter, but at the same time of sufficient height to cause the same to pack firmly and uniformly around the pattern.

While the above indicate the first essential requirements in successfully utilizing the force of gravity for machine moulding, at the same time numerous problems of minor importance were met with in perfecting a machine that would perform all the functions necessary to meet these requirements. This has been accomplished in the gravity moulder, which makes use of a simple mechanism for forming, compressing and discharging, from a sufficient elevation, elongated bodies of sand, or compact and separate strips of sand, each body being long enough to extend full width of the flask in one direction, and of such thickness that a series of these bodies falling into the flask side by side are required to form a layer of sand across the flask in the opposite direction.

In other words, by the gravity method the flasks are rammed by a succession of compressed bodies of sand falling and wedging beside each other until a layer is formed across the entire area of the flask, after which additional layers are built up in the same manner until the entire mould is formed in one solid mass of sand of the same degree of firmness throughout.

With this method of ramming it is unnecessary to vent the mould, as there are no hard spots caused by the rammer, and it leaves the sand in a free but solid condition in the mould.

POSSIBILITIES OF THE ELECTRIC FURNACE IN FOUNDRIES.

"We do not want to produce chemical changes in our mixtures if we can help it. We want only to melt quickly, produce very hot iron, and punish the metal as little as we can. Every time we melt the metal under present conditions we hurt it somewhat, the degree of the damage done depending upon a number of conditions, both chemical and physical. We counteract this by additions of steel to reduce the total carbon or select the silicon content in such a way that with the reduction in this element incident to the process, a strong iron results. If, however, we could have a process which in no way changes the composition, we could put into the melt just what we want out of it, and one of the serious difficulties of foundry metallurgy would be solved. Again, if we could regulate the temperature in such a way that the iron is not overheated while melting, but can be heated up very high afterwards, we could obviate the oxidation of the metal during the melt, and in addition remove any existing evil of that kind by the use of ferro-manganese in the melt when it has been brought to practically a steel temperature, at which point the ferro-manganese will do its work.

"The induction furnace, it seems to me, fills these requirements, and I would like to see more work done along this line for the foundry. It would seem to me that scrap of all kinds, properly selected, is all that need be melted, cleaned by some ferro-alloy, and then cast in the usual way. The enormous steel production will always yield scrap enough to supply the demand for small steel castings, once a process of this kind can be made to work commercially.

"Taking the non-ferrous metals. A brass foundry would have abundant use for an electric melting process if run on the line laid out above. The melting loss in the brass foundry in zinc and tin is a great one, and one that runs up into money quickly. A clean wasteless process, as the electrical one should be, would be a boon to the industry. There are many foundries which could melt, with a short periods of time during the day, or night when their plant is not used for its regular purposes. Hence only the electrical apparatus proper might be required, the necessary power being available."—Dr. R. Moldenke in "Electrochemical and Metallurgical Industry."

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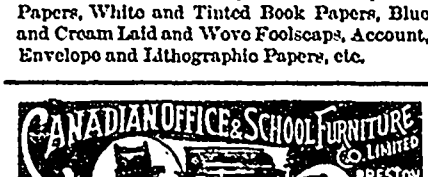

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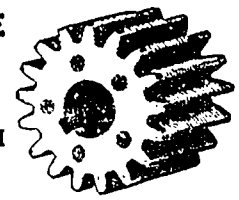

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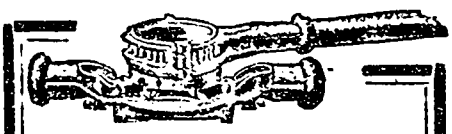

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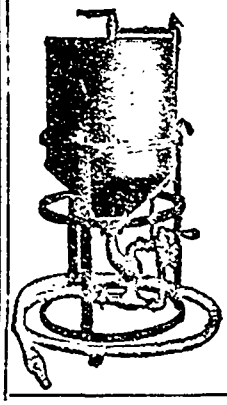

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INDEX TO ADVERTISEMENTS.

See Classified Index Beginning on Page 207

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INDEX TO ADVERTISEMENTS (Continued).

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