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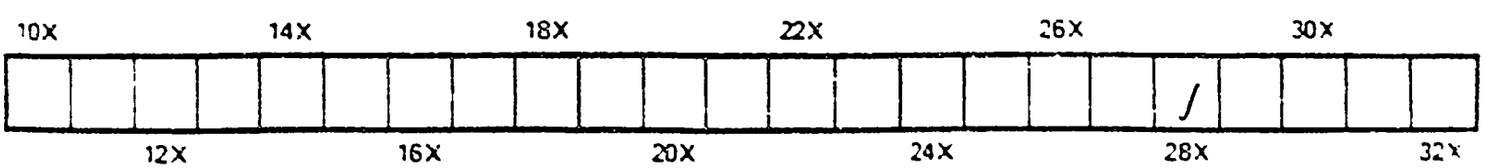

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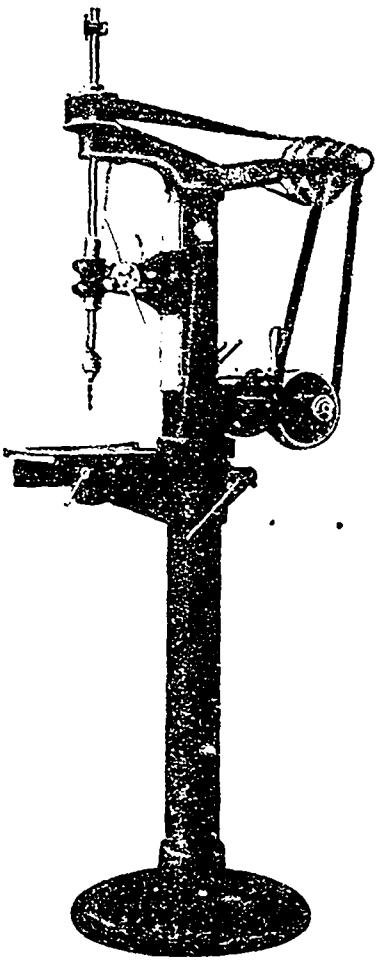

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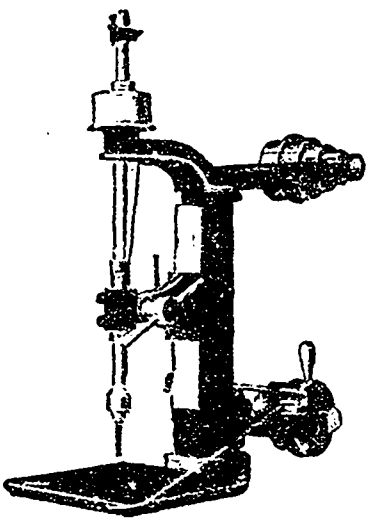

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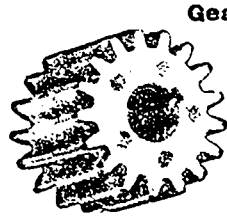

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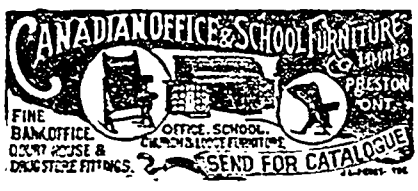

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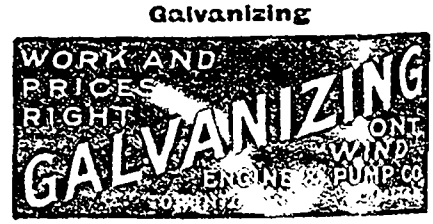

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Some Things a Manufacturer Should Know About Coal.

ADDRESS BY E. G. BAILEY BEFORE THE NATIONAL ASSOCIATION OF COTTON MANUFACTURERS.

The majority of manufacturers are dependent upon the combustion of coal for the operation of their mill. The man who is responsible for the continuous and economic operation of the plant should know: (a) Where he can always get coal when he needs it. (b) Where he can get coal of such character and quality that his plant will not be crippled for lack of steam. (c) What coal is the most economical for him to burn. (d) How to convert a large percentage of the heat energy of the coal into useful work.

When plants are at any great distance from the mines it becomes necessary to store a considerable quantity of coal. This involves additional expense, due to the extra handling, value of storage space, and loss of coal both mechanically and chemically. The loss due to oxidation or weathering of coal not only reduces the calorific value of the coal but as the temperature of the pile rise, the oxidation becomes more rapid until the ignition temperature is reached and much additional labor and expense are necessary to prevent the burning of the coal and often the destruction of other property.

It seems that the rate of circulation of air through a coal pile has more to do with this question than any other condition outside of the character of the coal. The heating is mostly very irregular throughout a pile, as there are usually spots where the temperature is much higher than in the surrounding space

Many plants are so limited in boiler capacity, have such poor draft, or some kind of grate or stoker, that it is possible for their boiler room force to keep steam with only certain kinds of coal. While this is not an ideal state of affairs, it is a condition that exists in a large percentage of the power plants in this country and unless a man knows what coal will develop the required boiler horse power in his plant he may have the costly experience of shutting down a part or all of his mill. There is a great deal of difference in the rate of combustion of different coals. The percentage of volatile matter, coking properties, amount and nature of ash are the principal factors upon which depends this characteristic in various coals It is not always the better or higher priced coals that give the best satisfaction under such conditions, for a cheaper coal might give more satisfactory results than are being obtained with the highest priced coal on the market, but the risk of experimenting has seemed too great for the management to consider stepping out of the well beaten path.

In buying steam coal the amount of heat that may be developed from it is the measure of its value to you. There is no by-product that may be utilized except that in some cases the sale of ashes might be considered in this connection but their removal is generally an additional expense Two coals at the same price and containing the same number of heat units may not be equally desirable The difference in volatile matter might cause the lower to prove more satisfactory under certain conditions of smoke restriction, while the higher volatile coal would probably be more applicable in a plant with fluctuating load. The amount and nature of ash in regard to the formation of clinker often need to be considered.

The liability of spontaneous combustion of one coal more than another may make it advisable to pay several cents per ton more for one coal containing no more heat units than the other.

The following table shows the analysis and results of evaporative tests of some of the better coals, together with their price f.o.b cars at the plant of an inland New England mill.

Coal.	Moisture.	Volatile	Fixed Carbon	Ash	Sulphur.	B. t. u.	Lbs. water evaporated from and at 212 degrees F.	Price f.o.b. plant.	Relative cost per ton with coal A as basis By B.t.u.	Relative cost per ton with coal A as basis By evaporation.
A	1.25	17.94	73.15	7.66	2.07	14,354	9.93	$4.60	$4.60	$4.60
B	1.43	17.59	71.58	9.40	1.09	14,032	9.73	4.55	4.65	4.64
C	1.17	30.51	61.01	7.31	0.99	14,251	9.79	4.65	4.69	4.71
D	1.36	16.42	71.35	10.87	1.77	13,811	9.60	4.58	4.76	4.74
E	1.75	19.58	71.95	6.72	0.82	14,533	10.03	4.86	4.80	4.79
F	3.72	21.06	66.90	8.32	1.36	12,834	8.80	4.40	4.92	4.96
G	1.74	31.16	53.68	13.42	2.93	12,833	8.67	4.60	5.14	5.27

In this case it appears that neither the best nor the lowest priced coal would be the cheapest to buy.

In this table the coals are arranged in order of cost for equal amounts of heat generated and equal evaporation, but in selecting a coal for any particular plant it might be policy to select a coal that would cost a little more money in order to obtain some particular advantage that a certain coal might have over another. Comparing coals A and B, coal A appears to be better in every way except that it contains about one per cent. more sulphur than does B. For steam purposes the sulphur is of little importance below two per cent. at least, so that coal A would probably be selected on account of its being five cents per ton cheaper on a heat unit basis, and there would also be less ash to handle. In case a plant had limited raft and boiler capacity a coal like C might be selected in preference to B or even A, with a difference of nine cents per ton in favor of coal A Should the prevention of smoke be an item of considerable importance coal D would probably be purchased at an additional expense of seven cents per ton as compared with coal C Of the two coals D and E there is a difference of only four cents per ton, and that would scarcely pay for the additional cost of handling ashes, the possibility of not being able to carry the load without the use of more boilers, and other expenses that are greater with a poorer coal.

While coal E is the best all round coal, it would not pay to purchase it when coal A could be obtained for 20 cents per ton cheaper on a heat unit basis, and 19 cents per ton cheaper on an evaporation basis

Coals F and G are both much inferior to the others and their purchase would not be considered when any of the other coals were available at the given prices. Judging from the ash and sulphur alone, it would seem that coal F would be better than either B or D, but a certain characteristic appears in this coal that makes it different from any of the others. It is "crop" or "red" coal, coming from a part of the seam near the outcrop, and has become saturated with the surface water that has been percolating through it for hundreds of years. The moisture is much higher than in any of the other coals and it contains a still larger percentage of combined water that is not driven off by the mere drying of the coal. If a man were depending upon the ash determination alone he would never detect that he was receiving an inferior quality of coal; in comparison with coal A he would be paying 20 cents per ton less for the coal, yet he would have to burn so much more of it to develop the same horse power that he would actually be losing 32 cents per ton, or $16,000 per year on a 50,000 ton contract.

Coal G is high in ash and sulphur and correspondingly low in B.t.u., so that it would be a very expensive fuel to burn at the price quoted, and in comparison with the other coal, you would not consider it. Yet there are thousands of tons of it being burned and the manufacturer seems to be willing to pay the price.

After the most economical coal has been selected, it remains for the manufacturer to see that such coal is delivered. Throughout the year the coal company may send coal of different quality from other mines, or the quality of the coal from the same mine may change, due to impurities encountered in the seam or lack of preparation at the mine. The coal operator may know of the change in quality, as many of them follow up their product by chemical analysis and inspection much more closely than does the purchaser, but it is the manufacturer's place to know what he is getting, and prove to the coal company that the coal has changed and that he is not receiving the coal he is entitled to by the contract.

In addition to knowing what is the most economical coal to buy, the manufacturer must know how to convert a large percentage of the heat energy of the coal into useful work. The efficiency of a boiler plant depends primarily upon the completeness of combustion of the fuel and completeness of absorption of the generated heat by the water or steam in the economizer, boiler or superheater. It is impossible to generate into available form all of the heat energy of the coal Some coal and carbon are lost with the ashes, while combustible gases and carbon in the form of smoke usually escape unburned to a greater or less extent. The loss due to incomplete

combustion depends largely upon the design of the grate, furnace and combustion chamber, as well as the proportionate rate and method of supplying coal and air to the furnace

The question of smoke prevention must receive more consideration from the manufacturer in the future than it has in the past. While it may not be possible or economical to prevent the least traces of smoke, yet there are many stacks in different parts of the country that issue so little smoke that they are not at all objectionable. In most cases where other than anthracite coal is being burned, the prevention of smoke has been accomplished by means of furnace design and the method of firing.

The analysis of the flue gases is the best criterion for regulating the conditions of a furnace so as to obtain nearly complete combustion with a minimum of air excess. The perfecting of automatic gas indicators and recorders will do very much toward increasing the boiler room efficiency.

No one kind of boilers or heat-absorbing apparatus will give equal satisfaction in all plants. This depends upon location of plant, kind of water, uniformity of load, kind of coal, etc., and must be determined in each individual case.

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It has been known for years that graphite is an excellent lubricating body when associated with oils or fats. Strenuous efforts, extending over a long time, have been made to suspend graphite in a liquid to be used as

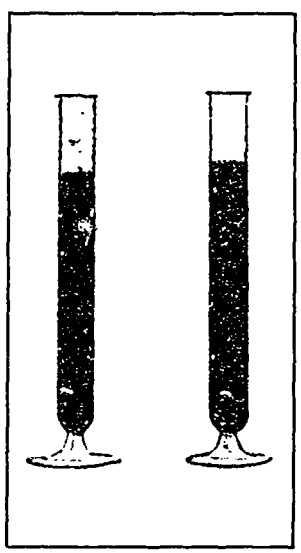


FIG. 1.

a lubricant, but all these efforts have heretofore been unsuccessful. It is a well recognized fact among scientific men that plain water has many advantages as a lubricant if it had sufficient body to withstand the pressures brought to bear and to which lubricants are subjected. Possessing the two principal elements of perfect lubrication, viz., high specific heat and low viscosity necessary to control the temperature of bearings and reduce friction, its fatal lack of body and quality of corrosion make it worthless as a lubricant.

Less than half a century ago petroleum oils were unknown commercially, and animal oils were used altogether for lubrication. In the forty years that have passed, the world has witnessed the growth and development of the wealthiest corporation of the world, the major part of whose business is the production of lubricating oils. Vast as this business is, not only because of the increasing requirements for lubricants and the lack of supply to meet the demand in animal oils and fats, but also because of its superior quality over the latter, there is yet much to be desired in lubrication. Experience has demonstrated that oil in itself will only do this to a certain extent, and that graphite properly introduced would effectively reduce friction to a minimum; hence the endeavor to suspend graphite in a liquid that would permit of its being properly fed into a wearing surface, which, owing to its specific gravity, has baffled the efforts heretofore made by engineers to accomplish this much desired result.

In 1906 Mr. E. G. Acheson, the well known inventor of the process of making graphite from various forms of coal, coke, etc., discovered a process of producing in the electric furnace a fine, pure, unctuous graphite. He undertook to work out the details of its application as a lubricant. In the dry form, or mixed with grease for heavy work, it was easy to handle, but he desired to enter the entire field of lubrication as occupied by oil, and in his efforts to suspend it in oil he encountered the same troubles that his predecessors met in this line of work. It would

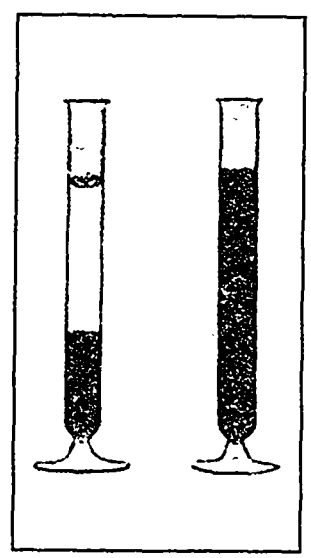


FIG. 2.

quickly settle out of the oil. His unctuous graphite was just plain, simple graphite, and obeyed the same laws which govern the natural product. In 1901 Mr. Acheson experimented with the object of making crucibles with artificial graphite. This led him to study the clays used as a binder of the graphite in manufacturing crucibles.

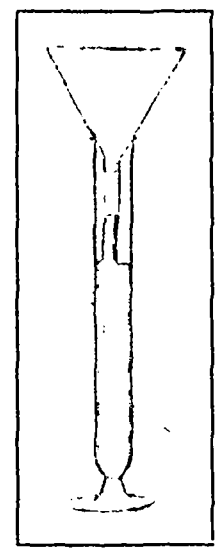


FIG. 3.

The clays used for this purpose are imported from Germany, which, although possessing more plasticity and greater tensile strength than American clays, are of very similar chemical constitution. He learned that residual clays—those found at or near the

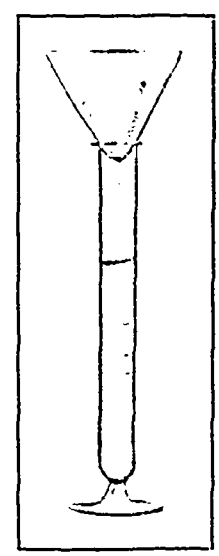


FIG. 4.

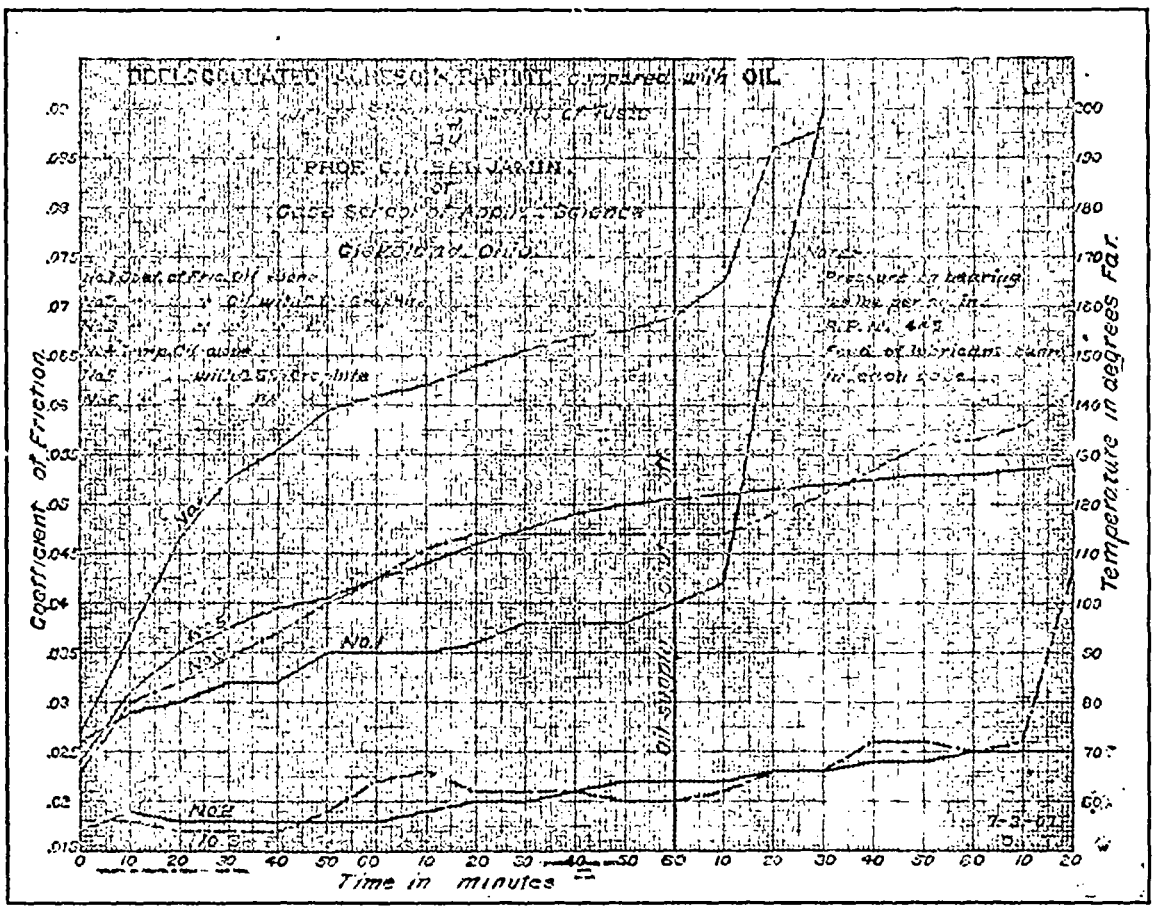
point at which the feldspathic rock was decomposed—are not as plastic or as strong as the same clays are when found as sedimentary clays at a distance from their place of origin, and chemical analysis failed to account for these decided differences. Mr. Acheson reasoned that the greater plasticity and tensile strength were developed in the transportation from the place of origin to their final bed, and that it was probably due to vegetable extracts impregnated during their migration, and acting on this theory he experimented on clays with various vegetable extracts—tannin being one of them—

and found that when treated with a weak solution of gallotannic acid or extract of straw, a moderately plastic, weak clay was rendered exceedingly plastic. The "effect" —for such it must be termed—is that of finely dividing the particles to a condition far beyond that attainable by mechanical means —to a condition perhaps molecular. Having failed to successfully suspend the new unctuous graphite in oil, it occurred to Mr. Acheson that tannin might have the same effect on graphite as it has on clay. He tried it and found that it made the graphite miscible with water, and the unctuous graphite, when treated with a comparatively small quantity of gallotannic acid, remains suspended in the water without the slightest

of tannin. Not all of the graphite put into the tube with the tannin remained suspended. In fact, in this case illustrated, nearly all of it had settled, only a sufficient amount remaining in suspension in the water to blacken it. To cause a complete "deflocculation" and suspension of all the graphite requires prolonged mastication in the form of a paste with the water and tannin, and after this mastication has been carried out, the effect is much improved by diluting the mass with considerable water, allowing it to stand for some weeks with occasional stirring. After this prolonged mastication and exposure of the graphite to the water and tannin, an intensely black liquid is obtained, consisting of water, the small amount of tannin and the

and test tube; but now we find in the lower part of the tube a clear solution. This is the water in which the graphite was suspended, the graphite now being caught in the filter paper above—and was brought about by adding to the black liquid a very small quantity of hydrochloric acid, which caused the contained graphite to flocculate, i.e., to group into larger particles so that it will no longer pass through the filter paper. It will be noticed that the filter paper in Fig. 3 is black on the outside, caused by the deflocculated graphite passing through the paper; while the filter paper shown in Fig. 4 remained white on the outside, the graphite not passing through its body.

Deflocculated graphite in water possesses



disposition to settle or separate. The black liquid passes with ease through the finest filter paper, showing that complete deflocculation has been effected by the simple addition of tannin and water to the dry graphite.

The accompanying photographs show the effect of tannin in suspending graphite. Fig. 1 shows two test tubes, one containing Niagara River water and disintegrated Acheson-graphite, the other tube containing a similar amount of water and graphite, with the addition of a little gallotannic acid and a drop of ammonia. This photograph was taken immediately after the tubes were thoroughly shaken. Fig. 2 shows the same tubes and contents four minutes having elapsed after being shaken, the tubes having been undisturbed during that interval. These tubes furnish a very clear demonstration of the quick settling of graphite in plain water, and the remarkable effect of the presence

contained graphite. This liquid will pass through the finest of filter papers, and the contained graphite will remain in suspension for weeks and months—apparently for all time. A graphite content of one per cent. makes the liquid so thick that it runs through the filter paper slowly; reduced to two per cent., it goes through quickly.

Figures 3 and 4 illustrate an experiment with water containing two per cent. of graphite. Fig. 3 shows a glass funnel containing a fine filter paper resting in a test tube. In the tube below the funnel is a black liquid, which has passed through the filter paper. This black liquid is water containing two per cent. of deflocculated Acheson-graphite. The fact of its having passed through the filter paper leaves no doubt of the impossibility of separating the water and graphite, while in this condition, by filtration. Fig. 4 shows, as in the former case, the funnel, filter paper

the remarkable property of preventing rust or corrosion of iron and steel. The "Acheson Effect" is thus produced on amorphous bodies generally, such as alumina, lamp black, graphite clay and siloxicon.

This success in deflocculating graphite and causing it to remain suspended in water was exceedingly gratifying, but realizing that the world has been educated to the use of oil as a lubricant it would be difficult to induce engineers to substitute water and graphite. Mr. Acheson undertook to solve the problem of replacing the water with oil. He has eventually accomplished this by removing the water in which the deflocculated graphite is suspended—suspending it in oil in such quantity as will reduce friction to a minimum and suit the varied requirements of the most difficult lubrication. The lasting qualities of this new lubricant are far greater

than the expensive oil lubricants heretofore used.

Severe tests have demonstrated its superior efficiency as will be shown by the accompanying curve giving the results of a series of tests made by Prof. C. H. Benjamin, late of the Case School of Applied Science, Cleveland, Ohio, and now Dean of the Engineering Schools, Purdue University, and there is every reason to believe that Deflocculated Acheson-graphite with oil will become a popular agent for all classes of lubrication.

This material is made by the International Acheson-Graphite Co., Niagara Falls, N.Y., and at Niagara Falls, Ont.

Ferro-Concrete and its Relation to Constructional Steelwork with Modern Buildings.

By A. W. Ellson Fawkes, Mem Inst. C.E. London, Ont.

With the advance of constructional steelwork we are forced to notice the rapid growth of ferro-concrete, for all classes of engineering and constructional works, especially the latter.

At first the prejudices against it were great, owing to it not having had a long life, and therefore of an unknown quantity, but now they seem to be passing away and the doubtful misgivings as to its advantages are now all in its favor.

That such misgivings should have existed was only reasonable when it should be remembered that questions of the effect of the combination of two different materials—concrete and steel were involved, but these questions are now largely disposed of and the architect and engineer may safely adopt this method of construction, providing that materials are good and properly put together.

Ferro-concrete takes the place of steelwork rather than for concrete, and substitutes girders, lintels, arches in retaining walls, etc., and in such cases, we have regarded the dead weight as largely, if not altogether responsible in resisting forces set up, but in dealing with similar cases in ferro-concrete the dead weight has little if anything to do with the matter, and the structure may be designed to almost entirely resist bending moment if true economy is to be obtained.

Although it need only be said that ferro-concrete in general is capable of being used satisfactorily for all work where steel is at present employed. The exceptions would include cases where light loads occur, such as roofs, trusses, ties, etc., but for warehouses, bridges, fire-proof buildings, and all constructional works that have to contend with heavy loads, ferro-concrete is strongly advocated by leading engineers.

I do not for one moment wish to detract the values from constructional steelwork, for it is so closely allied with ferro-concrete that the one is dependent upon the other in combined construction, but, with constructional steelwork alone the slipshod methods adopted by the contractors and often overlooked by the architect who has not made constructional steelwork a study, resulting in a building that should be solid and free from vibration, to be only on a level with the old time wooden structure. A few of the causes of vibration in steel buildings are the uneven stresses and faulty rivetting, together with a rough building up of the steelwork.

For instance, a building that is to have a steel shell cased with brick or stone, invariably has columns put in to support the centre of the building, the rivetting is faulty or what is called *half holed, the girders and joists* do not always rest upon the angle cleats that are put in to support them and so depend upon the rivets for their support which at its best has only a tensile strength of 25 tons per square inch, and shearing strength of 17 to 20 tons per square inch. Then again, the other end of the girders and joists are often so securely built into the brick and masonry work, and every little space filled up, so that there is not room for the expansion of the steel work and something has to go. The brick and masonry starts first and becomes moveable. Settlement takes place, thus throwing a double stress upon an already weak rivet connection and reducing the tensile and shearing factor of safety to its minimum.

For the firm or firms who insist on having a constructional steel framework, I would advise them to observe the following points: Excavate until a good bottom is reached capable of withstanding the weight to be put upon it, put in a good cement concrete made up of the following. One part cement with a tensile test of 600 pounds per square inch, two parts of sand or gravel, three parts of broken stone. This mixture gives good results and the interstices are about 25 per cent. Allow from ten to fourteen days to elapse before erecting the steelwork to give the foundation a chance to harden. A general method is to allow one inch for grouting under the stanchion and column bases, thus mading a solid and satisfactory result at the base.

In cases where angle cleats are put in to support the girders and joists see that this is followed up and support not on the rivets. Fix pad stones in brickwork to carry ends of girders and joists. Give all steelwork that comes in contact with brick and masonry work, two coats of cement wash to prevent corrosion and if concrete floors are put in strengthened with expanded metal, the result is a reliable fireproof building, and its stability is beyond doubt.

Publications Worth Reading.

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

Castings Directory.—A 152 page directory of manufacturers of foundry supplies and equipment, alphabetically indexed. Published by The Gardner Printing Co., Cleveland, O.

St. John, N.B.—A 56 page folder, giving information regarding the fishing, hunting and camping resorts of New Brunswick, with a great many attractive views of the scenes which attract tourists, especially during the summer months, from all parts of the United States and Canada to that province. Copies can be had from the New Brunswick Tourist Association, 85 Prince William Street, St. John, N.B.

Immedial Colors on Cotton Yarn.—A 15 page color chart showing 360 standard shades for dyeing on cotton yarns, together with full directions for dyeing. The Cassella Color Co., 59 William Street, Montreal.

Vertical Gas Engines.—A 16 page booklet describing the vertical gas engines for electric lighting, pumping and general power purposes, made by The Bruce Merriam Abbott Co., Cleveland, O.

April Proceedings A.S.M.E. The monthly bulletin of The American Society of Mechanical Engineers, giving papers on "Gas Engine and Producer Guarantees" and "A Simple Continuous Gas Calorimeter" by Prof. C. E. Lucke, and discussions on these papers as well as the discussions on several other papers recently given before that body. Application for copies of this report should be made to Calvin W. Rice, secretary, A.S.M.E., 29 W. 39th Street, New York.

Ignition Appliances. A 96 page catalogue with illustrated descriptions of the ignition appliances and auto accessories handled by the Canadian General Electric Co., Toronto.

Butt-Welding.—A 12 page catalogue explaining the process of butt-welding wrought iron and steel also pipes and rods by Thermit. Illustrations, with full explanatory notes, give full information. The Goldschmidt Thermit Co., 90 West Street, New York, or William Abbott, Montreal.

Among the firms who were supplied with pumps by the Smart-Turner Machine Co., Hamilton, were the Northern Navigation Co., Collingwood, Ont., the Great Lakes Dredging Co., Port Arthur, Ont., Harry Mack, Tavistock, Ont., the Normal School at Peterboro, Ont., and the Grand Trunk Railway System.

Over 5,000 men are employed on the western division of the Grand Trunk Pacific and it is hoped that before July the line will be in operation as far as Saskatoon. Supplies in large quantities are going forward from Winnipeg and it is estimated that $10,000,000 will be spent on this division during the next year and a half.

The Department of Marine and Fisheries are asking for tenders for about 3,000 fathoms of chain with swivels and shackles to suit to be delivered at Halifax, St. John, Charlottetown, Quebec and Montreal. Tenders must be in before May 1.

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CANADIAN MANUFACTURER

and Industrial World

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THE LATE JESSE J. CASSIDEY.

By the death of Mr. Jesse J. Cassidey, president of The Canadian Manufacturer Publishing Co., Limited, and editor of THE CANADIAN MANUFACTURER, Canada loses its foremost authority on industrial problems and its most forceful advocate of protection for Canadian manufacturers. At the same time those associated with him in business lose a warm-hearted and considerate co-worker, one whose friendship was highly prized and whose memory will be long revered.

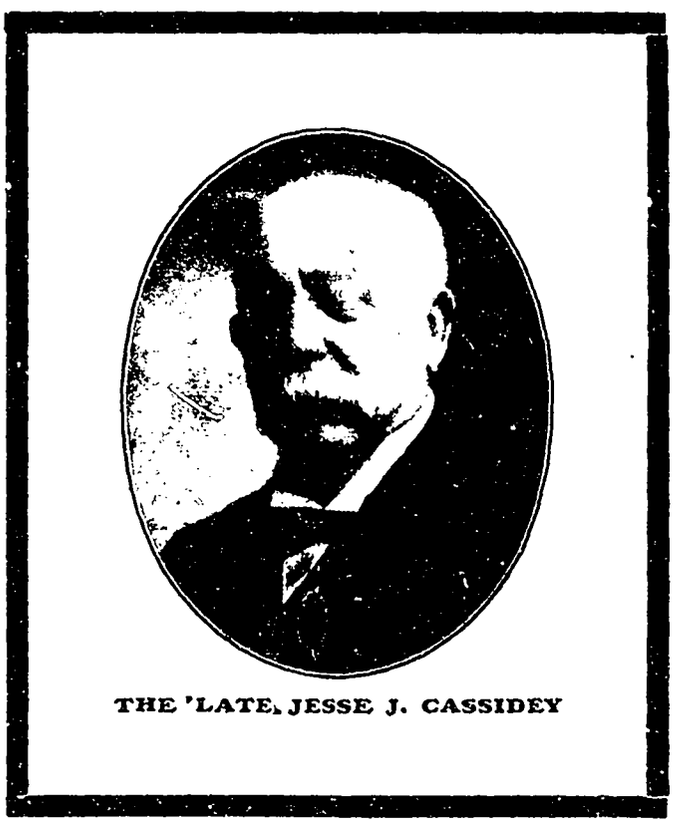
Jesse J. Cassidey was born in Wilmington, N.C., in 1832. His journalistic career started in a humble way on Wilmington papers but to one of such aggressive temperament and keen reasoning powers a broader field was inevitable and he removed to St. Louis, Mo., where he was engaged in editorial capacity on industrial papers of national scope.

In 1887, when the battle on behalf of protection was being vigorously waged, Mr. Cassidey was induced by Mr Frederic Nicholls, then owner of THE CANADIAN MANUFACTURER, to come to Toronto and accept the post of editor of this paper.

His recognition as an authority on matters of tariff, subsidies, transportation, the needs of all classes of industry, though particularly the ship building and textile industries, was instantaneous and THE CANADIAN MANUFACTURER at once assumed the position of the foremost industrial paper in Canada.

On Mr. Nicholls' resignation as secretary of the Canadian Manufacturers' Association Mr. Cassidey was unanimously elected to succeed him. Though never lessening the energies devoted to the service of the paper, his efforts on behalf of the Canadian Manufacturers' Association were not only unceasing but productive of results all along the line. In fact the protection now accorded, as a matter of course, to many industries in Canada is due in large measure to the aggressive, though quietly conducted, campaigns initiated and carried to successful issue by Mr. Cassidey, acting as secretary of the Canadian Manufacturers' Association and editor of THE CANADIAN MANUFACTURER. One instance of this was referred to in the last article written for this paper by Mr. Cassidey, the history of "The Iron Industry in Canada," in our issue of January 3, this year.

For months during the years 1892 and 1893 an educative campaign was carried on by Mr. Cassidey in this paper, to convince the large iron consuming manufacturers of Canada that the establishment of blast furnaces in Canada, that the development of an iron industry would be to their profit as well as in the general public interest. On April 24, 1893, a deputation, composed of members of the Canadian Manufacturers' Association waited on



THE LATE JESSE J. CASSIDEY

Sir Oliver Mowat. Mr. Cassidey as spokesman for the delegation, explained the situation and presented a memorial asking that a bonus of $2 per ton should be paid on pig iron produced in Ontario, this bonus to be paid for at least ten years.

The educative campaign had been so complete and the agitation had been carried on so quietly and effectively that no opposition to the proposal was offered and the Ontario Government promptly granted the bonus suggested. To this was due the development of the industry in Ontario, for the Hamilton Blast Furnace Co. (now the Hamilton Steel & Iron Co.), which was organized and started in operation within three years, was the practical beginning of the iron industry along modern lines in Ontario. Many other instances could be cited, which

show the importance to Canada and to Canadian industry of the service rendered by Mr. Cassidey during the past 20 years.

Until 1900 he gave his best energies, his unswerving loyalty and his self-sacrificing devotion to the work of the Canadian Manufacturers' Association and to the interests of its members. So quietly and effectively was the work done however, that some of the more flambuoyant members, to whom the blare of trumpets and the counting of numbers meant more than the winning of important victories for protection, succeeded in creating dissatisfaction and Mr. Cassidey resigned as secretary of the Association.

Since 1900 he has given his energies exclusively to the work of making THE CANADIAN MANUFACTURER of utmost value to the manufacturers of Canada. Until the end of 1907 there was no diminution of energy and no decline of brilliancy or forcefulness of argument. It is probably true that as a writer and editor he has been closer to the heart and mind of the average Canadian manuafeturer than any other writer on the Canadian press.

Yet it is the fact that to a large degree the exceptional esteem in which Mr. Cassidey was held by hundreds of manufacturers, as well as by his co-workers, was due not so much to the brilliance and forcefulness of his writing as to his personal qualities. While aggressive and fond of controversial subjects he never fought unfairly even when his opponents stooped to trickery or deceit; warm-hearted and impetuous to an unusual degree, no effort was too severe and no sacrifice too great on behalf of any cause he espoused; while never lacking in dignity there was so much of geniality in his smile and so much of good-fellowship in every expression of his face that had that rare magnetism which wins and holds friends in every class and under all circumstances. Many manufacturers throughout Canada as well as Mr. Cassidey's co-workers will feel the loss of a warm friend by his demise.

AS TO WOOD PULP AND PULP WOOD.

"The mills of the gods grind slowly!" The intelligence of a democratic community is slowly awakened. For years THE CANADIAN MANUFACTURER has been emphasizing the fact that Canada is wasting her inheritance by permitting the export of her natural resources in the raw state instead of building up within the Dominion industries which shall bring these products to a finished state and in so doing give employment to a steadily increasing number of Canadian workingmen.

As far back as 1892 this paper drew attention to the waste of Canadian pulp wood areas by permitting the export of pulp wood instead of insisting that it be manufactured into paper, or at least into pulp, in Canada. At that time the Canadian pulp wood areas seemed inexhaustable. To-day it is realized that this is a mistake and there is every indication that legislative steps will be taken that should have been taken 16 years ago, when suggested by this paper.

We quote from our issue of November 18, 1892:

We are in receipt of a communication from a manufacturer of wood pulp, who operates one of the largest factories in Canada, in which he complains that while American manufacturers depend to a very great extent upon Canadian forests for their supplies of pulp wood which is expected free from Canada, and imported free into the United States, Canadian manufacturers, when desiring to export pulp to the United States, is met there with a tariff duty of $2.50 per ton on their product. He suggests that if a suitable export duty were imposed upon pulp wood that many of the American mills particularly those which manufacture for export, would be forced to remove to Canada, and that this country would receive the benefit arising from the industry, instead of being only a provider of wood to be manufactured in another country. He thinks, that if an export duty were levied, to be enforced only against such countries as impose an import duty on Canadian made pulp, the result would be that the United States would in the interest of its pulp industry, be forced to remove or greatly modify its duty on Canadian pulp.

About the same arguments apply in this matter of export duty on pulp wood as in the case on saw logs. A statement of a few facts would throw light on the situation. It is a fact that cannot be denied that hundreds of thousands of cords of pulp wood are supplied every year from Canadian forests to American pulp factories. It is also a fact that the available supply of pulp wood in the United States is rapidly decreasing; that that which is obtainable there is cut in regions remote from the mills; that the cost of transportation of it makes the article very expensive, and that the cheapest and most available supplies are drawn from Canada. Large quantities of pulp manufactured in the United States find sale in other countries, the export of the article having increased wonderfully of late years. Of course very much of these exports of pulp are made from Canadian wood.

With their characteristic selfishness, and in face of the fact that their pulp industry could not flourish without Canadian wood, our American neighbors placed an almost prohibitive duty on Canadian pulp while admitting the wood duty free, just precisely as in the case of saw logs and nickel. A result of this is the fearful crippling—yea, the almost total destruction of a most valuable Canadian industry. Our pulp manufacturers are excluded from the American market, while at the same time the American manufacturers are formidable competitors with them in Canada in the purchase of the raw material—pulp wood. Restricted to the home market excluded by the McKinley tariff from the United States market, they find the Canadian railroads doing a heavy business hauling Canadian pulp wood past the idle doors of the Canadian pulp factories and into the United States, duty free, to supply raw material in American pulp mills.

It is this sort of business that is driving Canadian capital and Canadian labor into an exodus from which the country is suffering. Instead of the government affording some protection to this important industry and to others which we have repeatedly named, it could not act more in accord to the McKinley idea than what it now does. The McKinley desire is to build up American manufacturing industries, and the Dominion Government gives them great assistance and encouragement in doing so. The McKinley tariff puts a heavy duty on wood pulp, while pulp wood is on their free list. The raw material must be obtained in Canada, and the absence of an export duty on pulp wood keeps American factories in a condition of booming prosperity, while Canadian

factories are in a condition of collapse. The McKinley tariff puts a duty on Canadian lumber, while saw logs is on the free list, and because we have no export duty on saw logs hundreds of millions of feet of Canadian logs keep Yankee mills busy, while Canadian mills are rusting in idleness. The McKinley tariff puts a duty of $200 per ton on refined nickel, while nickel ore and matter are on their free list; and because we impose no export duty on the crude material, all that we have to show for our invaluable mineral wealth are the holes in the ground from which it was taken, while many expensive and valuable plants are springing into existence in the United States for the purpose of refining Canadian nickel. How long, O Lord, is this suicidal policy to continue? How the McKinleyites must chuckle and smile at the cordial co-operation of the Dominion Government in their endeavor to boom American manufacturing industries at the expense of Canadian enterprises. They take away our pulp wood, our saw logs and our crude nickel, and although Canadians protest, their Government look wise and promise that something will be done about it "by and by." They see Canadian manufacturing establishments shut down and thousands of Canadian workmen thrown into idleness, but they do nothing. They see thousands of Canadian workmen following Canadian raw material into a foreign and not very friendly country, seeking the occupation there of which they had been deprived at home; and they see that these unwilling exiles are met at the boundary line and denied admission unless they forswear their allegiance to Canada and become American citizens, and not a hand do the Canadian Government raise to correct the evil and to give continued employment to Canadians in Canada.

SOBRIETY A NECESSITY.

A generation or less ago the successful salesman was a person who could ingratiate himself into the favor of buyers and by developing a spirit of jovial good fellowship, secure the lion's share of the business the buyers were placing. Out of this fact grew the customary invitation to "come over to the hotel and have something."

Far more potent than prohibition or local option or any other device of the legislative reformer has been the force that has changed these conditions to the prevailing ones which now make sobriety a necessity in salesmanship in ninety-five cases out of a hundred.

Competition may be the cause of some evils in business but it has been the factor which has made merchant and manufacturer more careful and more business-like in his buying. The buyer of to-day, whether he be owner or manager or a specialized purchasing agent has learned that it is not wise to base his orders on the geniality of the salesman but rather on the comparative merits of the goods offered him.

To the extent the geniality or friendship begets confidence it is an advantage to both buyer and salesman but the moment it is obvious that the salesman is relying on his friendship or his good fellowship, as expressed by "treating" the buyer becomes shy and suspicious. He has learned the folly of placing orders for inferior goods at high prices, just because a highball or two were offered him.

The days of the "treating" salesman are over. The day of the clean living, hard working, clear thinking salesman who depends on the merits of his line and his ability to emphasize those merits is here. Sobriety is one of the great essentials of salesmanship to-day.

TECHNICAL EDUCATION.

There seems to be a general awakening throughout Canada to the value of technical education in all branches of industry. In this is one of the hopeful signs of the times, as the supremacy of Canada as a manufacturing country will, during the next fifty years, depend in large measure on the technical knowledge and skill of those in charge of its industries.

Let us have ample diversity and breadth of technical instruction in our universities; let us have trade schools and technical schools, even a moderate degree of manual training in the public schools.

It is, however, equally important that the practical men—the managers and superintendents—in charge of our factories, our mills and our foundries shall be progressive, shall keep in touch with mechanical progress. It is not necessary to ask these men to drop their work for years to attend the lecture rooms of our universities.

The technical paper is to the practical factory superintendent or foundry superintendent what the scientific school at the university is to the student. The wide awake manufacturer will see to it that his superintendent and foreman are constant readers of the formost technical papers in their line.

Then, too, there are the conventions and exhibitions, where a practical man will absorb more information in a week than a "freshie" student will absorb in his first year at college.

Every practical foundryman and every foundry foreman in Canada should attend the convention of the American Foundrymen's Association in Toronto in the week from June 8 to 13. Apart altogether from the papers read by some of the foremost metallurgists and foundrymen in the world and apart from the entertainment provided, this convention will offer to Canadian foundrymen an unprecedented opportunity to examine the most up-to-date foundry appliances and see many of them in operation. At the Philadelphia convention in 1907 over 500 tons of foundry equipment was shown, the floor space of the exhibits exceeding 45,000 square feet. At the Toronto convention over 100,000 square feet of floor space will be occupied. A cupola will supply molten iron and power will be provided, so many of the actual operations of modern foundry practice can be witnessed any day during the convention.

During the same week the Canadian Electrical Association will hold their convention in Toronto and it is quite clear from the list of papers to be read, as published in another issue, that the practical electrician, be he superintendent or manager, who attends this convention will be amply repaid for the time given to the trip.

Such conventions as these should receive more attention from the manufacturers of Canada than has been the case in the past. Give your superintendent an outing that will make him more valuable to you when he returns.

Conditions and Prospects of British Trade in Canada.

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

FROM THE CHAMBER OF COMMERCE JOURNAL—(*Continued from April 17th issue.*)

ALCOHOLIC AND OTHER BEVERAGES.

Wines.—In 1906 the import of wines was $729,199, principally from France. The United Kingdom's share was $48,451.

Ale, Beer and Porter.—In view of the large and increasing production of beer in Canada there is but a small demand for the imported articles, though there has been an increase in the demand for certain special brands of American and British bottled beers. In 1906 the British share was $157,118. A great deal might be done by advertising.

Spirits.—The imports of spirits in 1906 were $2,196,721, of which the United Kingdom supplied $1,179,050. "Nothing seems to threaten the taste for 'Scotch,' and it will be noted that the increase in the importation into Canada in five years is 53 per cent."

Aerated and Mineral Waters.—The Canadian production is rapidly increasing and the imports are small, but show a slight increase, and amounted in 1906 to $178,083. The chief countries of supply are the United States ($75,285), France ($56,866), and Germany ($21,076). There is no entry from the United Kingdom. In a country of hot summers, where there are many new and rapidly growing towns, there is a larger consumption of aerated, mineral and bottled waters than elsewhere, owing to some degree of uneasiness with regard to the water supply.

BRICKS, TILES AND POTTERY.

There is a large local production of these goods. The imports from the United States in 1906 amounted to $649,966, and from the United Kingdom to $136,953, being chiefly fire bricks in both cases.

BROOMS AND BRUSHES.

The total imports of brooms and brushes amounted to $286,937 in 1906, of which $135,917 came from the United States, $67,073 from France, $32,620 from the United Kingdom and $24,100 from Germany. The Canadian production rose from $952,608 in 1900 to $1,444,803 in 1905. This is a line of business which the British firms appear to have allowed to slip through their hands. Practically the whole of the Canadian supply of brushes and combs, etc., was formerly obtained from England, it is now almost all purchased from France and Germany.

CEMENT.

Imports of cement in 1906 were valued at $1,003,002, of which the United States sent $689,380, the United Kingdom $223,118 and Belgium $45,109. Imports from Japan began in 1903 with $17,185, and have increased to $28,252 in 1906. The output of cement in Canada was valued at $765,876 in 1900 and $2,271,002 in 1905, an increase of 196 per cent., whilst the increase in imports in the same period was only 12 per cent. Various particulars as to prices are given in the report.

GOLD AND SILVER GOODS.

Under this head the total imports in 1906 were valued at $588,100, of which the United States contribute $305,398, and the United Kingdom $209,791. There is little doubt that the American trade in these goods is maintained because of smartness of design and energy in pushing sales.

JEWELLERY.

This is an interesting market, and with enterprise should constitute a useful field for British manufacturers. English pearl jewellery is preferred to that of any other country. In many lines Germany is a keen and aggressive competitor. The American and German articles are fantastic, dainty and attractive; the British goods are heavy and would seem in the eyes of Canadian buyers comparatively unattractive. Dainty and new styles are desired by the Canadian rather than jewellery such as might remind him of family heirlooms. In fancy goods such as silver-mounted belts, inkstands, paper knives, etc., Germany is a strong competitor. Canadian firms send buyers to Europe, and in Vienna and Berlin the goods are displayed in a more tasteful fashion than in London. In 1900 the Canadian manufacture amounted to $996,313, and in 1905 to $2,356,710. The total imports in 1906 were $887,919, of which the United Kingdom sent only $92,523, the United States $692,459, Germany $66,499, and France $21,290.

Silver ware of English make is preferred, and it should not be difficult to hold this market.

Various hints as to increasing British trade in this direction will be found in the report.

LAMPS AND BRASS GOODS.

Germany is a keen competitor in the matter of lamps and is placing on the Canadian market handsome and durable articles at a reasonable price. The English brass goods are, rather too dear to permit of extensive sales

MUSICAL INSTRUMENTS.

In 1906 the total imports of musical instruments were valued at $601,791, of which the United Kingdom supplied $32,770, and the United States $413,727. The Canadian manufacture amounts to about 5½ million dollars per annum. England supplies concertinas, jew's harps, drum heads and brass band goods. The United States imports are made up largely of pianos. It is said that pianos built for use in England are not suitable for Canada, as the wood will not stand the climate, and the pattern is entirely different from Canadian and American.

OILCLOTH AND LINOLEUM.

It is understood that only one firm in Canada manufactures oilcloth, and no figures of production are given. Oilcloth and linoleum are being more used in Canada than hitherto, largely for sanitary reasons, and there ought to be considerable opportunities for expansion in this trade. So far the import trade, which has substantially increased recently, is almost entirely in the hands of British manufacturers, who in 1906 sent $708,134 out of a total import of $735,806.

PAPER.

The total imports of paper and manufactures thereof (principally pads, not printed, papier-maché ware, manufactures of paper and printing paper) in 1906 amounted to $3,176,955, of which the United States supplied $2,345,745, and the United Kingdom $614,281. The value of paper produced in Canada was $874,049 in 1900, and $1,923,000 in 1905. The production of pulp and paper in Canada seems destined to assume large proportions, and therefore the prospect for British manufacture does not seem promising.

RUBBER AND RUBBER GOODS

Under the heading of rubber and elastic goods the Canadian manufacture rose from $1,173,422 in 1900 to $2,335,358 in 1905. The import in 1906 was $3,589,722 by far the largest items being crude rubber, gutta percha, and unmanufactured india rubber. The trade is almost entirely taken by the United States with $3,452,282 in 1906, mainly crude rubber, rubber recovered, rubber substitute, and hard rubber in sheets. The British share of the imports was $101,000, almost entirely manufactured.

SEEDS.

The Canadians are large exporters of clover grass and flax seed, and also import flax seed heavily—almost entirely from the United States. Otherwise, the principal imports are garden, field, and other seeds, amounting to $374,974 in 1906, and of this the United States provides $336,840, the small balance being provided by the United Kingdom.

WATCHES AND CLOCKS.

Swiss and cheap American watches kill their own in Canada, the average English watch being too heavy and expensive for Canadian and American taste. There has been a decline in the sale of English clocks with a corresponding increase in that of the German article. There is a fair sale of wooden clocks, and in this instance France and Germany take particular pains to study the Canadian climate, the wood being subjected to special processes so as to be unaffected by temperatures. The total import in 1906 of clocks was $342,894, and of watches $936,154, of which the United Kingdom sent only $10,660 and $27,210, respectively. "The manufacture in Canada of watch cases in 1900 was valued at $707,840 and in 1905 had shrunk to $332,100 (less than half), the import of watch cases fell from $107,[illegible] in 1902 to $74,088 in 1906; but the [illegible] of watch actions and movements increased from $577,013 in 1902 to $767,847 in 1906. We have here, therefore, more than 50 per cent. decrease in production of cases, about 33 per cent. decrease in the export of cases, coupled with nearly 33 per cent. increase in the import of actions and movements. The question therefore arises where the cases come from into which the movements were put. No doubt the point will prove of interest to the trade [illegible] and it might be possible to suggest an answer, which, however, does not appear to come within the province of the report.

The Saskatchewan Electric [illegible] Ltd., Regina, Sask., has been succeeded by the Northwest Electric, Limited.

The Ventilation of Workshops.

From British Report in Technical Literature.

The present report has been prepared with a view chiefly to furnishing some general guidance as to the application of fans to the ventilation of factories and workshops. Experience has shown that serious mistakes are frequently made in the design of fan ventilation; and we therefore hope that a short and elementary account of the subject may prove of service to those owners and managers of factories and workshops who are not already familiar with the principles involved.

Selection of Fans.

Although fans of excellent construction, and driven either electrically or by pulleys, can now be very easily obtained, it must be clearly borne in mind that different types of fans are made for different kinds of work, and that a fan which is very well suited for one purpose may be quite unsuited for another. Generally speaking, fans may be divided into: (1) Low-pressure fans, those designed for moving air against very slight resistances (the difference of pressure on the two sides of the fan not exceeding, say, ¼ inch of water as measured by a water gauge); and (2) high-pressure fans, working against resistances which may mount up to several inches of water. The resistance due to the passage of a given volume of air through the fan itself is greater for size, very much smaller in the latter than in the former class. Hence, if the low-pressure fan is used to drive air against any external resistance, practically the whole of the power expended may be wasted in overcoming the internal resistance of the fan. On the other hand, if a low-pressure fan is used against a high external resistance the quantity of air passed will be very small, and the power will be thrown away in friction and the production of eddies about the fan.

Low-Pressure Fans.

When air requires to be moved against very slight pressure, the so-called "propeller" fan is usually employed, although low-pressure centrifugal fans can also be advantageously used in some cases. In the propeller type of fan the blades are arranged similarly to those of the screw propeller of a ship, the air being driven forward by the revolutions. By this means enormous volumes of air can be delivered through the fan with a very small expenditure of power, and there is little or no resistance on the inlet side. For a good type of propeller fan working under practical conditions, with unobstructed flow of air, Mr. W. G. Walker gives the following convenient formula as the result of a number of experiments:

$$\text{Horse power} = \frac{Q^3}{D^5} \times 0.000015;$$

Q = quantity of air discharged in cubic feet per second, D = diameter of fan in feet.

Thus, with a discharge of 12,000 cubic feet per minute, or 200 cubic feet per second, and a fan 4 feet in diameter, the horse power required would be $\frac{200^3}{4^5} \times$ [illegible]. This example will give an idea of the very large volumes of air which can be moved by a propeller fan with a trifling expenditure of power, provided there is no resistance.

The air delivery by a propeller fan varies in direct proportion to its rate of revolution, while the power needed to drive it varies as the cube of its velocity. Hence for a given expenditure of power much more air is propelled with a low than with a high rate of revolution. In practice, however, it is best to run a fan at a considerable velocity; otherwise the flow of air may easily be greatly diminished, or even reversed, by the influence of wind.

With increasing resistance the air delivered by a propeller fan rapidly falls to almost nothing, although considerable power is being expended in driving it. The waste of power is due to the fact that air passes back through the center of the fan, where the velocity of the blades is low, and the work done by the tips of the blades is absorbed in merely expelling this same air.

The resistance may be due (apart from the influence of wind or of insufficient inlet openings to the room) to construction of the ducts, inlets, or outlets connected with the fan, to sharp bends or rectangular junctions with branch ducts, and to friction along the sides of ducts. If the sectional area at any part of a duct conveying air to or from a fan be reduced to less than the sectional area of the fan, it is evident that the linear velocity of the current at this point will be correspondingly greater than at other points in the duct. But the work expended in setting air in motion varies as the square of the velocity, and any considerable narrowing of a duct thus introduces a resistance which a propeller fan cannot overcome, with the result that the power applied to the fan is wasted. It is a common mistake to suppose that by constricting a duct leading to or from a propeller fan a materially greater velocity of air current can be obtained. The influence of the constriction is simply to diminish the flow of air. Another source of resistance is any sharp bend in a duct. A rectangular bend practically doubles the pressure needed to merely set the air in motion in the duct, and a rectangular junction with a branch duct has a similar effect. A loss about half as great also occurs at the inlet opening of a duct unless it is trumpet shaped. Resistance due to friction along the walls of a duct is proportional to the total internal surface of the duct, and to about the square of the linear velocity, but inversely proportional to its sectional area. It becomes a serious item if long and narrow ducts are employed, and such ducts should always be avoided where propeller fans are used. Frictional resistance depends also upon the roughness of the internal surface of a duct, and these surfaces should be as smooth as possible. The narrowing of ducts by deposits of dust should also be carefully avoided, and the better to ensure this when ducts are being constructed ample provision should be made at suitable points for the easy removal of dust and other accumulations.

High Pressure Fans.

Where air currents of high velocity are needed, as, for instance, in exhausting the dust from wheels used in dry grinding, or where narrow or tortuous ducts cannot be avoided, it is necessary to have fans capable of working effectively against considerable resistances. For this purpose centrifugal fans are usually employed. In the centrifugal fan the air inlet is at the center of the fan, which is enclosed in a metal case, and the air is driven outwards in a tangential direction by the revolution of the blades into a space between their periphery and the case. As the outline of the case is somewhat like that of a snail's shell, this space gradually increases in cross-section towards the air outlet, so that the air passing outwards between the blades can escape freely at all parts of their revolution, and travel round the case to the outlet. A trumpet-shaped prolongation of the latter increases the efficiency of an exhaust fan.

According to the details of construction, centrifugal fans may be suited to deliver, with a given expenditure of power, either large volumes of air against a relatively low resistance, or smaller volumes against a relatively high resistance; and in selecting a fan the volume of air required, and the resistance against which it has to work, must be carefully considered. Centrifugal fans suited to work against the higher resistances have also a relatively high internal resistance, so that if they are set to work against a low resistance in ducts, etc., the energy is wasted on the internal resistance. Details with regard to the capacities of various types of fan may be obtained from the makers, who should specify the volumes of air delivered, as measured by an anemometer, with different resistances measured by a water gage, together with the corresponding horse powers required to drive the fan.

The resistances which have to be overcome by pressure fans are, of course, due to the same causes as in the case of propeller fans; but in practice the factors involved often differ in relative importance in the two cases. Thus the ducts connected with a pressure fan are usually longer in proportion to their cross-section, so that resistance due to friction is more important. There may also be many unavoidable bends in them. They are usually best made of metal pipes with smooth internal surface, all sharp rectangular bends or junctions being avoided and no leakage permitted; unless these points are attended to, resistance due to friction, etc., may mount to a very serious extent. On the other hand, the comparatively small resistances due to such causes as wind pressure, restricted inlet openings to a room, etc., are of much less importance than when a propeller fan is used.

Volume of Air Required, and Arrangement of Inlets and Outlets.

In designing any system of fan ventilation the first points to consider are the quantity of air required and its proper distribution. The quantity depends to a large extent on the distribution; and in many cases a relatively small quantity well distributed is far more effective than a large quantity badly distributed.

General Ventilation.

Certain impurities can hardly be prevented from becoming generally distributed in the air of a room, and can thus only be dealt with by general ventilation of the room. In most cases this is true of the products of respiration and of combustion of gas, the water evaporated in wet processes, and the heat given off from the moving or artificially heated machinery; and in some cases of the production

of dust. In removing these impurities or sources of inconvenience the supply of air must be sufficient for the particular purpose in view. If, for instance, heat or dust has to be removed, the ventilation must be sufficient to effect this removal, and not merely to dilute the products of respiration.

As regards impurities from persons and lights, the legal standard proposed by this committee in its first report was such as would prevent the proportion of CO^2 from respiration or combustion from ever rising beyond 12 volumes per 10,000 of air during daylight, or beyond 20 volumes at night with gas burning. If the distribution of air were perfect and constant this would imply a minimum ventilation by day of about 1,250 cubic feet of air per person and per hour. Since, however, the distribution is always more or less imperfect and liable to be interfered with by varying conditions of weather, about double this quantity of air would usually need to be supplied in order to conform to the standard. If more than about 2 cubic feet of gas per person and per hour were burnt in the room (or one flat-flame jet to three persons) an addition of about 1,500 cubic feet per hour for each extra flat-flame jet would probably be needed.

The quantity of air required to remove excessive heat and moisture cannot well be calculated in the same way, as the loss of heat through walls and roof is usually not known, and in any case varies with the weather. The air supply must therefore be regulated with the help of thermometers. Air in which the reading by the wet bulb thermometer exceeds about 70° begins to cause serious inconvenience with ordinary clothing, and this limit ought not to be exceeded in factories or workshops except under exceptional conditions.

Experiments show that that if the wet bulb reading rises beyond about 88° in fairly still air, the body temperature can no longer be prevented from rising seriously even in persons stripped to the waist and doing no work; and with muscular work under the same conditions the body temperature may rise rapidly at a wet bulb temperature of 80° With ordinary clothing this effect is considerably greater. At the upper limits it is not the temperature of the air, but that of the wet bulb thermometer that matters; and provided that the air is so dry that the wet bulb temperature does not exceed the limits specified, air temperatures up to 130° or more can be tolerated without rise of body temperature.

The following observations made recently by Dr. Haldane will illustrate this statement. With the air temperature at 131° and the wet bulb at 88°, the body temperature remained the same after 2¼ hours. With the air temperature at 89°, and the wet bulb at 80° on the other hand, the body temperature rose nearly 3° in the same time, and with the air temperature at 94° and the wet bulb at 94°, the body temperature rose 4° in two hours. The subject, who was the same in each of the experiments, was stripped to the waist, and resting. With moderately hard work and a wet bulb temperature of 87°, the temperature rose 4° in one hour.

Much higher wet bulb temperatures can, of course, be borne for short periods, but the body temperature soon rises seriously.

In removing steam from rooms it must be borne in mind that cold air is apt to cause condensation of aqueous vapor. Thus if air saturated with moisture at 80° is mixed with even 10 times its volume of air from outside at 40° condensation will nevertheless usually occur, and will always do so, whatever the dilution, if the incoming air is saturated with moisture at the outside temperature. If, however, the incoming air be warmed to a moderate extent as it enters, this condensation will be prevented, and the ventilation will serve the double object of cooling the room and preventing condensation. If it is only necessary to prevent condensation of vapor, and not to remove heat, the object can often be best attained by providing not extra ventilation, but heating arrangements. In the case of dyeworks, etc., where the building is often filled with steam from the vats, experience shows that the atmosphere is best cleared and condensation avoided by blowing in air heated by passing through a coil or other form of radiator.

To Prevent Injury by Dust.

As regards removal of dust, the standard of purity aimed at should always be sufficient to prevent injury to health, and should also be such as to prevent inconvenience and enable those employed to be clean when they leave work, after washing, if necessary. Dust from the disintegration of hard stone, steel grinding, etc., is extremely deleterious, and the same may be said of dust containing any poisonous constituent, such as lead.

It is sometimes difficult to say whether the inhalation of a given variety of dust is definitely injurious. Dust from any hard stone (such as flint, granite, sandstone, etc.) is undoubtedly very injurious to the lungs, producing a marked predisposition to phthisis. On the other hand, coal dust, cement dust, and probably many other varieties of organic and inorganic dust have by no means the same serious effects

In such cases the dust should, by special means, apart from general ventilation, be entirely prevented from mixing with the general atmosphere of a room, and the same remark applies to all poisonous gases and fumes.

Low Temperature Impairs Working Power

The effect of ventilation on the temperature of a working room during cold weather needs careful regulation. For sedentary work and fine manipulations a temperature of not less than about 60° is required. With lower temperatures the working powers of those present become impaired; and the effects of the low temperature are much increased by drafts. On the other hand, if the work implies active exertion lower temperatures are permissible, and some kinds of work associated with dust, fumes, etc., can best be performed in sheds open to the air. In general, the more clearly open-air condition can be attained to in any class of work the better; and whenever possible, windows should be thrown widely open in summer weather.

In general ventilation by fans the air may be either blown in (so called "plenum" system) or exhausted. The one or the other system may be most suitable according to circumstances, and in some instances the combination of both systems is desirable and most effective, as in the French or so-called dry cleaning, where the fumes of benzole, etc., require to be locally exhausted and fresh air supplied. The exhaust system is much employed on account of its simplicity, especially in sparsely occupied rooms, the air being exhausted by one or more fans placed in windows, walls, or roof, and allowed to enter by suitably-arranged openings, distributed at other parts of the room. The main advantages of this system are that no ducts are needed, and that the fan causes no draft in its neighborhood, while the cold incoming air causes little draft if given an upward direction so as to mix with the warm air of the room above the heads of the occupants. A fan or exhaust opening of any kind draws its air supply from all round without causing a draft in a particular direction. When however, air is entering through a fan or other inlet it is driven in a definite stream straight forwards owing to the momentum which has been communicated to it.

With exhaust ventilation correspondingly inlet openings are essential, apart from the chance opening of windows or doors. The inlet opening should have a total section area equal to or greater than the *fan opening* and should direct the air upwards so as to avoid drafts. Although a considerable amount of air may enter through the walls, etc., of a room, this quantity is usually insufficient, and owing to the neglect of inlet provision exhaust propeller fans may often be seen wasting most of the power communicated to them and producing no satisfactory result. The inlets should be so placed that the whole room is properly supplied with fresh air, the incoming air not being allowed *to pass straight* to a fan without displacing a due proportion of the foul air of the room. It is obviously a distinct advantage to have the exhaust outlets at the floor level. With this arrangement dust and particulate matter, including that from the mouths and persons of those present, are more effectually removed, since all particulate matter tends to fall. Loss of heat from the room is also diminished, as air at the floor level is colder. On the other hand, hot air and the products of combustion from lights are best removed by an outlet opening high up. The "plenum" system of ventilation possesses the advantage that the incoming air can be warmed or cooled as it enters, and if necessary moistened, or filtered free from smuts by passing it through coarse jute, cotton cloth or other efficient filtering material, placed diagonally or zigzag in the inlet duct so as to give a large filtering surface. As the draft is in an outward direction at all other openings than those through which the fan delivers, there is complete control over the quality of the air entering the room, and no chance of air being drawn in from contaminated sources. As regards the position and direction of inlets and outlets, the same conditions apply as in the case of exhaust ventilation.

ONTARIO AGENTS OF "NOVO" HIGH SPEED STEEL.

The Milroy-Harrison Co., 60 Richmond Street East, Toronto, have been appointed agents for "Novo" high speed steel, etc., for the province of Ontario, and carry a stock of these goods at the Richmond Street warehouse. Mr William Milroy, Montreal, is the Canadian representative of the manufacturers of this steel.

Busy Berlin.—The report of the annual meeting of the Berlin Board of Trade. This report gives a record of the town, statement of customs receipts, etc., also a list of the manufacturing establishments in the city.

THE CANADIAN MANUFACTURER is the one paper in Canada which goes directly into the hands of owners, managers and superintendents of manufacturing firms of all kinds and in all parts of Canada. That's why its advertisers agree that it is an exceptionally efficient advertising medium. That's why the amount of advertising carried this year is 30 per cent. larger than was carried a year ago. Note the number of new advertisers in this issue.

A Cupola Demonstration.

Arrangements have been made by J. deClercy, agent for the Societe Anonyme d'Exploitation des Brevets Cubilot A. Baillot, of Montreal, Canada, to exhibit a cupola in operation in connection with the Convention of American Foundrymen's Association, and the Exhibit of the Foundry Supply Association to be held in Toronto June 8-12. This cupola is now being erected in a temporary building adjoining Machinery Hall. The blast for the cupola will be furnished by one of the new Sturtevant turbine blowers operated by a steam turbine. A novel feature of the installation is that the exhibitors expect to put on the blast in the morning and to pour iron for an hour and then to bank the cupola for two hours during lunch time. Later it will be running in the afternoon for two hours or more. The principal point to be demonstrated is the possibility of furnishing a small amount of iron continuously for a long period with only a moderate consumption of fuel and also the possibility of starting and stopping the cupola at will. They guarantee to pour very thin light work and arrangements have already been made for pouring a large number of moulds for light, delicate castings. This demonstration will be unique and of great interest to many foundrymen.

CANADIAN ELECTRICAL ASSOCIATION CONVENTION.

On Wednesday, Thursday and Friday, June 10, 11 and 12, the Canadian Electrical Association will hold their eighteenth annual convention in Toronto.

Papers on the following subjects have been promised:

How to Increase the Station Load.

Loss and Unaccounted For Current.

Various Electrical Power Plants by European Designers, illustrated.

Modern Arc Lighting.

Various Distributing Sytems Adaptable to Cities and Towns.

Power Rates and Factors Which Influence Them.

Regulation of Electric Currents or Circuits.

Grounding of Transformed Secondaries.

Long Distance Transmission by Means of Direct Current.

Electrical Plant Earnings per Capita.

Electrical Franchises, Their Legal Status and Basis of Valuation.

Large Power Plants of America (illustrated).

The arrangements for the convention are in the hands of the following local committee: Ex-president R. G. Black (chairman); J. J. Wright, W. N. Ryerson, W. A. Bucke, J. A. Kemmeres, H. A. Moore, H. H. Macrae, W. G. Chase, T. F. Dryden, T. J. Lynch, W. H. Eisenbeis, C. H. Mitchell, W. B. Boyd, R. J. Clark and G. H. Hyde.

THE CANNON THAT MODERNIZED JAPAN.

Business is no longer a man-to-man contact, in which the merchant and the patron establish a personal bond, any more than battle is a hand-to-hand grapple where bone and muscle and sinew decide the outcome, says the Toronto World.

Trade as well as war has changed in its aspect—both are now fought at long range. Just as a present day army of heroes would have no opportunity to display the individual valor of its members, just so a merchant who counts upon his personal acquaintanceship for success is a relic of the past a business dodo.

Japan changed her policy of exclusion to foreigners after a fleet of warships battered down the Satsuma fortifications. The Samurai, who had hitherto considered their blades and bows good enough, discovered that one cannon was mightier than all the swords in creation if they could not get near enough to use them. Japan profited by the lesson. She did not wait until further ramparts were battered to pieces, but was satisfied with her one experience and proceeded to modernize her methods.

The merchant who doesn't advertise is pretty much in the same position as that in which Japan stood when her eyes were opened to the fact that times had changed. The long range publicity of a competitor will as surely destroy your business as the cannon of the foreigners crumbled the walls of Satsuma. Unless you take the lesson to heart, unless you realize the importance of advertising, not only as a means of extending your business, but for defending it as well, you must be prepared to face the consequences of a folly as great as that of a duelist who expects to survive in a contest in which his adversary bears a sword twice the length of his own.

Don't think that it's too late to begin because there are so many stores which have had the advantage of years of cumulative advertising. The city is growing. It will grow even more this year. It needs increased trading facilities just as it is hungry for new neighborhoods.

But it will never again give large support to neighborhood stores. Newspaper advertising has eliminated the strength of being locally prominent, and five-cent street car fares have cut out the advantage of being "around the corner." A store five miles away can reach out through the columns of the daily newspaper and draw your next-door neighbor to its aisles, while you sit by and see the people on your own block enticed away without your being able to retaliate or supply new customers to take their place.

It is not a question of your ability to stand the cost of advertising, but of being able to survive without it. The thing you have to consider is not only an extension of your business, but holding what you already have.

Advertising is an investment, the cost of which is in the same proportion to its returns as seeds are to the harvest. And it is just as preposterous for you to consider publicity as an expense as it would be for a farmer to hesitate over purchasing a fertilizer if he discovered that he could profitably increase his crops by employing it.

An Experience With Iron Crucibles.

From the Brass World.

In view of the fact that some concerns are using iron crucibles for melting aluminum, and that there is an undercurrent of belief that they are, in many instances, preferable to those of graphite, the following experience may prove of interest:

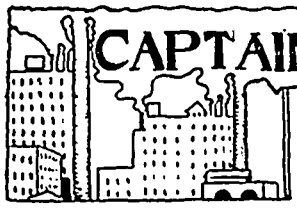
"We put in a furnace with an iron crucible for melting aluminum for making sand castings. The crucible was made of cast iron and held 1,000 pounds of this metal. The crucible cracked on the second heat. We had another made and this cracked on the ninth heat.

"We then had a steel crucible made and on the first heat the aluminum dissolved or 'ate away' about one-half of the thickness of the steel shell and ruined both the crucible and the aluminum. Our experience cost us about $95.

"It is our belief that a graphite crucible is the only thing to use for melting aluminum when both cost and quality of metal are taken into consideration. When iron is used, not only is the aluminum injured by contamination with this metal but the life of the crucible is a matter of considerable uncertainty."

FIRE WILL NOT DELAY DELIVERIES.

The Whitman & Barnes Co., St. Catharines, Ont., and Chicago, Ill., whose Canadian factory was damaged to the extent of $150,000 by fire two weeks ago, announce that the fire will not prevent them from giving prompt and careful attention to all orders sent them and invite orders and enquiries as usual.



CAPTAINS OF INDUSTRY

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

The Sunbeam Incandescent Lamp Co. of Canada, Limited, offered to purchase from the city of Toronto 100 feet of land on the east side of Dufferin Street, for the purpose of erecting a factory thereon.

The Toronto-Bellevil'e Rolling Mills, Belleville, Ont., have opened their works after being closed nearly all winter.

The Grand Trunk Pacific Railway have been granted an extension of two years in which to commence, and five years in which to finish branches from their main line to Montreal, to North Bay, and to Fort William, Ont., and the last of these is now being built, also lines to connect the main line with Ottawa, with Orillia, with Hudson Bay, with Regina, with Calgary, with Prince Albert, with Battleford, to Vancouver, to Victoria, B.C., to Dawson, to St. John, N.B.

Hennessey Drug Stores, Limited, Hamilton, Ont., have been incorporated with a capital of $50,000, to manufacture drugs, chemicals, etc. The provisional directors include J. P. Hennessey, P. W. McNab and W. H. Wilson, Hamilton, Ont.

The waterworks system, Brantford, Ont., will be extended.

Glencoe, Ont., are inviting tenders for an electric lighting plant.

The Sand-Lime Brick Co., Brantford, Ont., have received an order for 500,000 brick from the Borden Condensed Milk Mfg. Co. This company have now decided to build a factory at Tilsonburg, Ont.

T. Cannon & Son, Toronto, have been incoporated with a capital of $50,000, to carry on a general contracting and constructing business. The provisional directors include T. E. Cannon, A. E. Cannon and E. J. Cannon, Toronto.

Charles Ogilvy, Limited, Ottawa, have been incorporated with a capital of $150,000, to manufacture goods, wares and merchandise. The provisional directors include C. Ogilvy, W. M. Griffin and J. Anderson, Ottawa.

The Grand Trunk Railway Co. will erect new shops at Barrie, Ont.

The Canadian Pacific Railway Co. will erect a Y.M.C.A. building at Kenora, Ont.

The Canada Foundry Co., Toronto, have been awarded the contract for the year's supply of water pipe for North Toronto.

The Ever-Safe Horseshoe Co., Midland, Ont., have been incorporated with a capital of $100,000, to manufacture horseshoes, etc. The provisional directors include T. A. Richardson, D. Broderick, and J. Playfair, Midland, Ont.

The ratepayers of St. Mary's, Ont, voted favorably on a by-law empowering the council to grant the St. Mary's and Western Ontario Railway $40,000 of debentures.

The Grand Valley Railway Co. will commence reconstruction shortly. The line from Brantford to Galt, Ont., will be torn up and 80 pound rails substituted.

The Granite Crusher & Dimensions, Limited, Toronto, have been incorporated with a capital of $40,000, to manufacture granite, stone, etc. The provisional directors include J. H. McKnight, J. Preston and W. E. Douglas Toronto.

The Grand Trunk Pacific are having plans prepared by John S. Metcalfe of Chicago, for an elevator to be erected at Fort William, Ont. The elevator will have a capacity of 2,000,000 bushels.

The Oxford Milk Cooler & Dairy Supply Co., Ingersoll, Ont., have been incorporated with a capital of $40,000, to manufacture dairy utensils, etc. The provisional directors include E. E. Gustin, E. B. Jackson and F. Dutton, Ingersoll, Ont.

The township council of Malahide have decided to replace the steel bridge over Staller's Gully, east of Grovesend, Ont., with a cement arch.

A steel and concrete bridge will be built at Poplar Hill, Lobo Township, Ont.

The S. Knechtel Woodturning Co., Southampton, Ont., have been incorporated with a capital of $40,000, to manufacture furniture, bed springs, mattresses, etc. The provisional directors include S. Knechtel, E. Opperthauser, Southampton, Ont., and A. Opperthauser, Hanover, Ont.

The name of the Doherty Piano & Organ Co., Clinton, Ont., has been changed to the W. Doherty Organ & Piano Co, Limited. The present directors are W. Doherty, W. Jackson and C. E. Dowding.

The Wm. Peace Co., Hamilton, Ont, have been incorporated with a capital of $40,000, to manufacture iron, wood, metals, etc. The provisional directors include W. L. Peace, W. E. Millward and S. G. Richardson, Hamilton, Ont.

It is expected that work will soon commence on a proposed Carnegie library at Pembroke, Ont. Tenders are being asked for a site.

An ornamental winter building will be erected in connection with the Allan Gardens, Toronto, at a cost of about $75,000.

The elevator of the Grand Trunk Railway at the foot of Brock Street, Toronto, was destroyed by fire, April 21. Loss about $67,000.

The Keogh Chemical Co., Ottawa, have been incorporated with a capital of $120,000, to manufacture drugs, chemicals, etc. The provisional directors include W. Ryan, J. B. Gordon and P. White, Pembroke, Ont.

A new post office is being considered for Waterloo, Ont.

The machinery for the additional power plant of the Hanover Portland Cement Co., Hanover, Ont., is being installed.

The Henry Block, Rodney, Ont., was destroyed by fire April 22. Loss about $10,000.

The St. Mary's Wood Specialty Co., St. Mary's, Ont., have been incorporated with a capital of $10,000, to manufacture lumber, wooden articles, etc. The provisional directors include S. L. Doolittle, G. Brown and J. A. Johnson, St. Mary's, Ont.

A permanent fire brigade has been decided upon for Peterboro, Ont.

The ratepayers of Pembroke, Ont., will be asked to vote on a by-law to authorize issue of debentures to the amount of $40,000, for street improvements.

The congregation of Colborne Street Methodist church, London, Ont., will improve their church at a cost of about $75,000

Work will be commenced shortly on the construction of the new Sacred Heart church, Ottawa. When completed the cost will be about $100,000.

The George Street Methodist church, Peterboro, Ont., will be enlarged at a cost of about $2,000.

The Home Bank of Canada are erecting a branch at the corner of Queen and Ontario Streets, Toronto.

The Newman-Spriggs Electric Co., of Kingston, Ont., have been awarded the contract for lighting the new building of the Board of Education in that town.

Imperial Storage & Cartage Co., Toronto, have been incorporated with a capital of $40,000, to carry on a general storage and cartage business. The provisional directors include S. S. Nesbitt, W. D. Earnsey and E. C. Lean, Toronto.

The Agricultural Machinery Co., of Ottumwa, Iowa, have been organized with the intention of starting a branch in Canada. As yet the location of the plant has not been definitely settled, and before any decision is reached the promoters are expected to again visit Guelph, Ont., and see what inducements can be made to bring them there.

The Dominion Heating & Ventilating Co., Hespeler, Ont., have begun the manufacture of fire escapes.

The plant of the Wallaceburg Flax Mills, Wallaceburg, Ont., has been leased by the Canadian Flax Fibre Co., of Montreal.

The Macdonald Lumber Co., and the Peterboro Lumber Co., Lakefield, Ont., expect to open their mills shortly.

Gourlay, Winter & Leeming, Toronto, have purchased the plant of the McMillan Piano Co., at Kingston, Ont., and will operate it in connection with their Toronto works.

The Foley & Gardiner Mfg. Co., an American concern, manufacturing meat and hack saw filing and jointing machines, will open in Toronto a Canadian factory about the first of May.

Wm. C. Chambers, Harriston, Ont., has been awarded the contract for the construction of seventy-five miles of the Grand Trunk Pacific in the Lake Nepigon district.

Guelph, Ont., invite tenders up to May 8 for high duty pumping engine water tower and foundation and 3,000 feet of cast iron pipe.

It is expected it will take another year to complete the waterworks system at Loch Lomond, Fort William, Ont.

The factory of David McMackon, stave and headings, Highgate, Ont., was burned out last week.

Application has been made for order to wind up the Cornwall Paper Mfg. Co., Mille Roches, Ont.

The Royal Bank of Canada has secured judgment against the Standard Bearings, Limited, Niagara Falls, Ont. This company was formerly the Henderson Roller Bearings Co., Toronto.

Copeland-Chatterson-Crain, Toronto, have been incorporated with a capital of $1,000,000, to manufacture perpetual ledgers, account books, office furniture, stationery, etc. The provisional directors include R. J. Copeland, A. E. Chatterson, Toronto and R. L. Crain, Ottawa.

The Universal Transmission Co., of France, Toronto, have been incorporated with a capital of $40,000, to manufacture automobiles, motor boats, gas engines, railway cars, hoisting machinery, machine tools, etc. The provisional directors include H. T. Canniff, Toronto; H. G. Hamilton and G. G. Hamilton, Sault Ste. Marie, Ont.

The Aylmer Pump & Scale Co., Aylmer, Ont., have been incorporated with a capital of $90,000, to manufacture pumps, scales, trucks, elevators, machinery, etc. The provisional directors include E. C. Jenkins, I. N. Newell and J. E. Richards, Aylmer, Ont.

The premises of the Pigeon River Lumber Co., Port Arthur, Ont., were damaged by fire recently. Loss about $6,000.

Eaton, Crane & Pike Co., incorporated under Maine laws, have been granted a license to carry on business in Ontario, manufacturing and dealing in paper, envelopes, and paper boxes.

The Canadian Steel Rolling Mills Co., Campbellford, Ont., have been incorporated with a capital of $100,000, to manufacture iron, steel, copper, brass, coal, coke, etc The provisional directors include W J Doxsee, A. H. McKeel and C E. Dunk, Campbellford, Ont.

The premises of the Whitman & Barnes Mfg. Co., St. Catharines, Ont., were destroyed by fire April 16. Loss about $150,000.

John Poag & Co., Hamilton, Ont., have been incorporated with a capital of $20,000, to manufacture lumber, timber, etc. The provisional directors include J. Poag, A. Andrews and C. H. Roper, Hamilton, Ont.

The Riordon Paper Mill, Merritton, Ont., closed down a few days ago for two weeks for some extensive repair work. Extensions are also to be made to the Hawkesbury plant.

The Trade & Travel Publishing & Advertising Co., Montreal, have been incorporated with a capital of $20,000, to carry on a general printing and publishing business. The charter members include W. H. Olive, J. S. Knowles and J. Peters, Montreal.

The Canadian Instrument & Testing Co., Montreal, have been incorporated with a capital of $20,000, to manufacture electric heaters and furnaces, meters, gauges, thermometers, induction coils, electric batteries, generators, gas engines, gas producers, gas fittings, machinery, etc The provisional directors include E. M. B. Archibald, Montreal, W. A. Henry and H. B. Stairs, Halifax, N.S.

The steam shingle mill of Messrs. Tilton & Raymond, Smith's Mills, near Stanstead, Que., was destroyed by fire April 25.
N.S.

The Sydney Cement Co., Sydney, N.S., will enlarge their plant in the near future.

The Oddfellows' Block, Glace Bay, N.S., was destroyed by fire April 23.

The Standard Mills, Limited, Montreal, have been incorporated with a capital of $50,000, to manufacture lumber, timber, minerals, etc. The charter members include R. Prefontaine, S. Dore and F. Lajoie, Montreal.

Stanley Garage, Limited, Montreal, have been incorporated with a capital of $15,000, to manufacture vehicles, boats, balloons, etc. The charter members include G. Kampf, F. H. Norman and R. Armstrong, Montreal.

Rose & Laflamme, Montreal, have been incorporated with a capital of $75,000, to manufacture goods, wares and merchandise. The provisional directors include H. W. Smyth, R. R. Hendery and J. Ritchie, Montreal.

Woodburns, Limited, Montreal, have been incorporated with a capital of $6,000, to carry on a general printing and lithographing business. The charter members include M. A. Phelan, S. C. Marson and G. J. R. Shuter, Montreal.

The Delaware & Hudson Railway Co. have purchased the Quebec, Montreal and Southern Railway, for the purpose of protecting the supply of pulpwood nessary for the continued operation and enlargement of the paper mills already located along the line of the Delaware & Hudson. This line will be completed to Ste Philomen by July 1st, and eventually to the terminus of the Quebec Bridge, to secure connection with the city.

The council at Notre Dame de Grace, Montreal, have awarded the contract for two important sections of the new sewerage system to Messrs. Henault & Hefferman, for the sum of $70,000. One section extends from the little River St. Pierre to the Upper Lachine Road, thence to the Hospital for Incurables, the other will lie along Sherbrooke Street and extend from Westmount to Kensington.

The City of Montreal has decided to apply a sum of $2,400,000 to permanent works, street paving and repairs to streets.

The warehouse of the Imperial Furniture Co., Hull, Que., was destroyed by fire April 23. Loss about $7,000.

The premises of the Grand Central Hotel, Chateauguay, Que., were destroyed by fire April 21. Loss about $13,000.

Pierre Paradis & Joseph Auste Boisvert have registered the firm of Paradis & Boisvert, manufacturers safes, etc., Montreal.

Alexander McLaurin has registered as vice-president of the St. Maurice Hydraulic Co., Limited, Montreal.

A. Sewell is erecting a sawmill at Gibson, N.B.

The Bathurst Lumber Co., Bathurst, N.B., will erect a concrete sawmill.

The Bank of Montreal will erect a new building in Moncton, N.B., this summer.

The Williard Kitchen Co., Fredericton, N.B., have secured the contract for the erection of the Transcontinental Railway between Grand Falls and Plaster Rock, N.B.

The Boston Carriage Co. have secured the carriage factory of Price & Shaw, St. John, N.B. They intend opening a large carriage factory there.

H. C. Gordon, H. W. Maud and F. Read, Sackville, N.B., are seeking incorporation as the Read Stone Co., with a capital of $[illegible],000

It is stated that the Canadian Pacific Railway will build a line from Gibson, N.B., to the Minto coal fields, a distance of thirty miles, and work a coal area for their own use.

Messrs. Mann & Baxter, Campbellton, N.B., have been awarded the contract for the erection of the Intercolonial Railway freight house.

The Board of Trade, St. John, N.B., have decided to urge the Dominion Government to have constructed a branch railroad affording the shortest direct connection between St. John and the National Transcontinental Railway.

Powers & Brewer, Woodstock, N.B., have been awarded the contract for the concrete work on the Canadian Pacific Railway bridges at Upper Woodstock.

A span-pier will be constructed at Digby, N.S.

The Marine & General Engineering Co. Sydney, N.S., have secured a site for their proposed works.

An addition is being erected to the Supreme Court building, Halifax, N.S., at a cost of about $25,000.

S. M. Brookfield, Limited, Halifax, N.S., have commenced the erection of the new Anglican Cathedral in that city. When completed the building will cost about $130,000

A new school building will be erected at Halifax, N.S., at a cost of about $35,000, to replace the Compton school recently destroyed by fire.

Tenders will be received at Virden, Man., up to May 10, for the building of such telephone lines and the installation of such telephones as will be required in the telephone system in the rural municipality of Wallace Man.

J. McDiarmid, Winnipeg, Man., has been awarded the contract for the erection of the examining warehouse in that city for the Public Works Department. The contract price was $276,000.

The ratepayers of Winnipeg, Man., will vote on a by-law to authorize an expenditure of $225,000, for hospital purposes.

The Winnipeg, Selkirk and Lake Winnipeg Railway line, which was taken over by the Winnipeg Electric Railway Co., Winnipeg, Man., has been converted into an electric line, and the first through electric car made the trip to Selkirk recently. The complete

electrical equipment is now in position, and an electrical service will be opened in the near future.

Work is now well under way on the new Great Northern bridge over the Pembina River just south of Gretna, Man. The pile work has been completed and the excavations have been made for the concrete foundations, which will rest on piles which have been driven to a depth of 35 feet, with only a few feet protruding, which will be buried in the concrete. With the exception of these piles, the structure will be almost entirely of steel and concrete.

The premises of the Imperial Elevator Co., and the Canadian Pacific Railway station, Mowbray, Man., were destroyed by fire, April 19.

The capital of the Central Electric Co., Portage la Prairie, Man., has been increased to $150,000.

The elevator of the Canadian Northern Railway at Eden, Man., was destroyed by fire recently.

The Rat Portage Lumber Co are erecting a warehouse at Norwood, Man

The old post office building, Winnipeg, Man., will be remodelled and used as a customs house.

A new Methodist Mission building will be erected in Winnipeg, Man.

A new post office is being erected at Selkirk, Man., by Brown & Garson.

T. D. J. Farmer, Hamilton, Ont., will erect a large block in Winnipeg, Man., at a cost of about $30,000.

The Manitoba Government will erect a large machinery hall in connection with the Agricultural College, Winnipeg, Man.

The Stephens Brick Co., Portage la Prairie, Man., have been incorporated with a capital of $100,000, to manufacture brick, stone, cement, and to carry on a general constructing and contracting business. The provisional directors include H. Stephens, G. Carter and J. Young, Portage la Prairie, Man.

Great Northern Gold Mines, Selkirk, Man., have been incorporated with a capital of $5,000,000 to carry on a mining, milling and reduction business. The provisional directors include A. I. Gordin, R. Bullock and T. J. Jones, Selkirk, Man

The Western Stone Co., Winnipeg, Man., have been incorporated with a capital of $40,000, to manufacture stone, brick, cement, tile, pipes, iron, etc. The provisional directors include J. Beaucage, W. H. Carter and J. E. Robertson, Winnipeg, Man.

The Winnipeg Garage, Limited, Winnipeg, Man., have been incorporated with a capital of $50,000, to manufacture automobiles, engines, motors, bicycles, carriages, etc. The provisional directors include E. H. Henderson, W Thompson and E. A. Pridham, Winnipeg, Man.

The Union Lumber Co., Winnipeg, Man., have been incorporated with a capital of $10,000, to manufacture lumber, timber, pulp, etc. The provisional directors include G. F. Galt, J. S. Hough, Winnipeg, Man., and O. A. Robertson, St. Paul, Minn.

The Havana Cigar Syndicate, Limited, Winnipeg, Man., have been incorporated with a capital of $100,000, to manufacture cigars, tobaccos, etc. The provisional directors include A. W. Krausmann, P. Prozesky and P. Samon, Winnipeg, Man.

Lighting Sytems, Limited, Winnipeg, Man., have been incorporated with a capital of $20,000, to manufacture gasoline, acetylene gas, lighting fixtures, etc. The provisional directors include P. D. Lock, A. G. Buckingham and E. M. Levins, Winnipeg, Man.

A larger hospital is being considered for Souris, Man.

Tenders are being called for the construction of the new plant of the Manitoba Linseed Oil Co., at St. Boniface, Man. When completed the plant will cost about $100,000.

The capital stock of the Wm. Pearson Co., Winnipeg, Man., has been increased from $80,000, to $240,000.

The tender of the Superior Portland Cement Co., of Orangeville, Ont., to supply the city of Winnipeg, Man., with 15,000 to 25,000 barrels of cement as recommended by the controllers. The order will amount to at least $40,000.

Burchard Lumber Co., Saskatoon, Sask., have been incorporated with a capital of $100,000, to manufacture lumber, timber, etc. The provisional directors include C. J. Burchard, Saskatoon, Sask., E. E. Heiner and W. H. Pierce, St. Paul, Minn.

The electors of Edmonton, Alta., granted a franchise to the American-Canadian Oil Co. for an extension of the pipe line from their property at Morinville to the city, and the laying of the mains along the streets The company propose to furnish the city with natural gas for lighting and domestic purposes.

The Russel and Windsor Hotels, Kamsack, Sask., will be enlarged and a new hotel will be erected.

Carter, Halls & Aldinger have been awarded the contract for the erection of the new jail at Moosomin, Sask.

The Grand Trunk Pacific expect to complete their line between Winnipeg and Saskatoon, Sask., early this month.

The Farmers' Milling Co. have been organized at Duck Lake, Sask., and an elevator and mill will be erected.

The Bank of British North America will erect a bank building at Duck Lake, Sask., at a cost of about $9,000.

A new fire hall is being considered for Calgary, Alta.

K. Morrison will again resume work in the manufacture of cement blocks at Carlyle, Sask., after having been closed down all winter.

Subways will be constructed under Albert and Broad Streets in Regina, Sask.

It is stated that W. F. Watson, formerly of Regina, will start a cement block works at Lanigan, Sask.

A new theatre may be erected at Calgary, Alta.

Lethbridge, Alta., will spend about $130,000 this year on improving the streets and sidewalks.

The Citizens' Lumber Co. have been organized in Medicine Hat, Alta.

The Twin City Coal Co., Edmonton, Alta., have been incorporated.

The Pincher Creek Brick, Power & Lighting Co. have commenced operations in Pincher Creek, Alta.

J. F. Stiles, Leduc, Alta., is erecting a planing mill in connection with his lumber yard.

The premises of Bahl & Jacobs, High River, Alta., were destroyed by fire April 24. Loss about $10,000.

The Bank of Montreal is opening a branch at Prince Rupert, B.C., the projected terminus of the Grand Trunk Pacific.

The British Columbia Agricultural Association, will erect a new building at Vancouver, B.C., at a cost of about $12,000.

A sewerage system is being constructed for Ladysmith, B.C.

C. J. Moore, Victoria, B.C., purposes erecting a large sawmill at Prince Rupert, B.C., to supply the Grand Trunk Pacific.

The Fraternal Order of Eagles, Nelson, B.C., will erect a building this summer at a cost of about $25,000.

The congregation of Mount Pleasant Presbyterian Church, Vancouver, B.C., will erect a new edifice at a cost of about $31,000.

The Bank of Montreal will erect a block in Enderby, B.C.

A hospital may be erected in Summerland, B.C., in the near future.

A telephone building will be erected at Nanaimo, B.C.

It is stated that the Royal Crown Soap Co., Winnipeg, Man., the Standard Soap Co., of Calgary, Alta., and the Royal Soap Co., Vancouver, B.C., are negotiating to amalgamate.

A Sizing Solution.

From the Textile World Record.

A process of sizing either woollen or worsted yarn with a mixture of potato starch and chloride of lime has recently been patented in Germany.

A relatively small quantity of a weak solution of chloride of lime not over 10 degrees Be., is added at the boiling temperature to the solution of potato starch. This mixture is stirred until it becomes thin and clear. The following is the recipe: To obtain a medium size, 50 pounds of potato starch is mixed in 100 pounds (12 gallons) of water, care being taken to break up all lumps. The mixture is then heated until it becomes thick. From 1 to 3 pounds of a 10 degree Be. solution of chloride of lime is mixed with 20 to 50 pounds (2 4-10 to 6 gallons) of cold water. The quantities vary according as wool or cotton is to be sized. The chloride of lime solution is then added to the starch mixture and boiled for 7 to 10 minutes until the odor of the chloride of lime has disappeared. The thick mixture soon becomes thin and transparent and can be used for sizing at a temperature of 120 to 140 degrees F. It is claimed that this sizing mixture, on account of being neutral, has no injurious effects on either the fibre or the color.

The aggregate production of copper in Canada in 1907 was about 57,381,716 pounds, an increase of three per cent over 1906.

Practical Hints for the Factory or Mill Superintendent.

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

Science in the Foundry.

By Wm. H. Hearne.

The selection of pig iron, its mixing and melting in the foundry, are becoming a matter of much more interest than formerly. Twenty-five years ago there was not a foundry in the United States that had a chemist in its employ, and scarcely a blast furnace running on foundry iron had a laboratory. Foundry pig iron was bought, sold and mixed entirely by its appearance and the experience the foundryman had had with the same brand previously. At that time this was a comparatively safe and satisfactory method to pursue, for the reason that at that time the ores and fuel from which each furnace made its product were largely drawn from local sources, and the name of the district in which the furnace was located told from what the iron was made.

The great growth of the iron industries since that time, the development of the railroad systems and the increased facilities the railroads offer for the assembling of materials, make it necessary for the foundryman to know either the analysis of the pig iron, or the ore and fuel that are used.

The chemistry of foundry practice is one of elimination, and this has been the cause of the almost limitless specifications. Really there is practically no positive knowledge, but all knowledge has been acquired by experiments, and most of these experiments have been made by men having preconceived ideas of the results to be attained. This, of course, is natural, and is probably the only way to go about it. The result is that an experiment is made with iron running silicon 2.50, phosphorus 0.80, sulphur 0.035, manganese 0.40, and the experimenter discovers that he has made a satisfactory casting. Consequently, when he wants an iron for this kind of work he demands iron of exactly this analysis, not knowing whether or not, if he had iron of silicon 2.00, phosphorus 1.10, sulphur 0.05, manganese 1.25, he would get the same result, and possibly a much better and sounder casting, for the phosphorus is, if anything, a greater fluidizer than the silicon, and the manganese is a powerful oxidizer. When the second iron is melted he would lose at least one-third of the manganese, and with it would go the sulphur from his iron and possibly some picked up from his fuel This will be especially true if he will tap his iron from the cupola into a big mixing ladle so as to give the manganese time to act.

There are four things necessary for a good foundry mixture, fluidity, soundness, softness and strength. How is fluidity to be attained? First, by hot melting, second, by the presence in the pig iron of certain alloys carbon, silicon, phosphorus and manganese and by freedom from sulphur. Practically pure iron is white and will not run at all, but will melt into a sponge and burn before it will run.

In ordinary foundry pig iron there is about 93 per cent. of metallic iron and about 7 per cent. of alloys, and it is the proportion of these alloys to each other that determines the character and grade of the iron.

The real softness of a casting depends on the total amount of carbon and on the proportion of graphitic to combined carbon.

In pig iron the proportion of free, or graphite, to combined carbon depends entirely on the rate of cooling, and the slightest accident at the time of casting will affect this proportion, and will change iron which should be 2X foundry to 2 plain or 3 foundry.

Chief among the foreign elements in pig or cast iron that affect the carbons chemically, is silicon. This element has the property of throwing out of solution the carbon in the graphitic form, and many melters seem to think it the only cure for all hard iron. Everything else being equal, it is safe to say that an iron carrying 2.50 per cent. silicon is a softer iron than one carrying 2 per cent. silicon. Silicon is not in itself a softener; it acts so only by affecting the carbons. An iron with 10 per cent. silicon can scarcely be drilled. Pig iron with 4 per cent. silicon will not contain as much total carbon as one of 2.50 per cent., as the silicon unites with the iron and robs it of some of its carbon, so that a high silicon pig iron never has the dark, open fracture of a 2.50 to 3 per cent. silicon iron.

Sulphur in Castings.

Sulphur is the most dangerous enemy of soft, sound castings, as it not only tends to combine the carbon, but by doing this, also causes the grain to close up quickly, and to retain in little holes or sacks gases which might and should escape. In this way it causes the casting to pit and be porous.

If iron can be kept fluid long enough the sulphur will all rise through the iron and pass off, as can easily be proved by drilling holes in any piece of iron of reasonable size, poured in open sand. If three holes are drilled, one above the other, the proportion of sulphur in each set of drillings will vary as the height.

The problem, then, is to give the sulphur a chance to get away before it is locked in the casting. There are many ways to do this, but the easiest and simplest is by using an iron carrying a fair percentage of manganese, with a large mixing ladle. In special cases it can also be done by putting into the mixing ladle a small amount of pulverized ferro-manganese, or a small amount of fluorspar or of aluminum. Any of these additions will cause the iron in the ladle to boil, and during this boiling the sulphur will be thrown off, and, as your molder will say, the iron is cleaned. Being free from sulphur, your casting will be soft as it will have the proper proportion of graphitic carbon. Most of the so-called patent fluxes for making soft steel castings are nothing but pulverized ferro-manganese, fluorspar, and powdered high ferro-silicons. Every foundryman can obtain these alloys himself and make his own fluxes.

The casting of pig iron in chill moulds has very little, if any, effect on the character of the iron, especially if the foundryman uses a mixing ladle. It does not affect the total carbon at all, if anything, it rather increases the amount of this element It somewhat increases the total combined carbon, owing to the sudden cooling or chilling of the surface; but if the iron contains the proper amount of alloys and is melted hot and tapped into a mixing ladle, the casting will be as satisfactory in every respect as though the pig iron had been sand cast. In addition, the chilled casting eliminates one source of trouble, i.e., the sand or other dirt in which the sand-cast pig iron is run

Streaks in Woolen Goods

From The Textil Zeitung.

Longitudinal streaks from any cause are a source of trouble, but the blame for them often lies with the finisher. They are more liable to occur in finishing hanks than pieces, as furrows are often produced in washing, and especially in milling, where the pressure of the milling rolls is great and the temperature fairly high, to say nothing of the presence of moisture. Unless the goods are carefully turned over during the process, i.e., if they pass between the bowls always in the same position, the furrows become accentuated and almost ineradicable.

In the first place, raising streaks may be caused by bad setting of the teazle frames. This makes some of the teazles penetrate deeper than others, so that they loosen the felt more than the other frames. This is a common cause of streaks, and the more so, the lighter the raising is. In raising heavy goods, the frequent changing of the teazles prevents this streaky trouble to a large extent. There is another danger with a slightly raised goods, i.e., that the finest part of the teazle is in the middle of it. This is, nevertheless, easily avoided by changing over the goods so that the same teazle does not act always on the same line parallel to the length of the hank or piece. It is perhaps scarcely necessary to mention that the stiffness of the cards or teazles should be less for goods to be slightly raised than for those in which the raising has to be a searching. In light raising the teazles must be old and worn, and the brush roller lowered when commencing so that the teazles only just brush the fabric To ensure level raising, the cloth

FACTORY LOCATIONS.

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

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

be turned every few rounds, and put on again the other end up.

Another cause of raising streaks is want of uniformity in the moisture in the goods. It is certain that a place comparatively dry will be raised differently from one having more water. Places which are too dry assume a dull, velvety appearance, and those which are too damp come out more lustrous and with less nap. Suppose that such goods have to have a close shear. Then, especially with goods dyed black or blue, the dried places appear in the form of grey streaks. The only remedy, which, however, is usually effectual—except in very bad cases—is to dampen the goods again—uniformly this time—and to repeat the raising. As the goods have been raised before, great care is required the second time, and it is important not to allow the teazles to act across the lay of the fibre.

Another important point is to keep the same gig, as far as possible, for pieces of the same width. If a lot of narrow pieces are raised and then a lot of wide ones, the middle teazles are more worn than those at the ends of the frame, which have not touched the narrow goods. Hence streaks occur near and parallel to the selvages, due to that part of the piece being more sharply raised than the middle. If only one gig is available, narrow pieces should be shifted often from side to side during the raising, so that the end teazles are used on it as well as those in the middle of the frame. In the case of the lists or selvages raising faster than the centre of the cloth, canvas belts should be stitched round the gig cylinder just where the lists run, so that raising is stopped at the part covered by the canvas.

Raising streaks are often produced when the ends of the pieces have not been properly sewn together. If the seam is not straight—and especially if it is not flattened down—creases are the inevitable result, and the ridges of the creases are raised more than the troughs. This trouble may extend to considerable distances from the seam. It is hardly necessary to say that the gig must be provided with a proper width-stretcher to prevent creases from being formed during the actual raising. No mechanical stretcher however, is so efficient for this particular purpose as the two attendants pulling out the lists by hand just before they pass under the breast roller.

Care must be taken that streaks due to previous operations are absent when the goods come to the gig. If, for example, there are milling creases, they must be taken out before the stuff is raised. If these creases are only slight, they can be got rid of by wrapping the wet goods tightly on a roller and leaving them there for from twenty-four to thirty-six hours. If this will not do, the goods must be run through boiling water and then allowed to cool while wound as tightly and as evenly as possible on a roller. If this does not answer, an expander must be used, submitting the goods to it in a damp state. Any streaks due to faulty execution of processes preceding raising are sure to be made worse when the goods are passed through the gig.

The best method of eliminating mill rigs and creases is to roll the fabric on a roller under strong tension across the breadth, then immerse cloth and roller in a boiling cistern and boil for three or four hours. Let the fabric cool before unwinding from the roll.

Detecting Textile Fibres.

From the Textile Mercury.

The various classes of textile fibres may be arranged under three heads: Vegetable, animal and artificial. Under the designation of vegetable fibres come cotton, hemp, jute, linen and ramie; animal fibres: wool and silk; artificial fibres: nitro-cellulose or Chardonnet silk, Pauley silk, viscose products, and gelatine or vandura silk.

Various methods are known for distinguishing between these different fibres. With the exception of the use of the microscope most methods are based upon certain definite colorations obtained with different chemical reagents. The first steps to be taken are those which aim at completely freeing the material under examination from sizes, dressings and finishing compounds, and to decolorize it as far as is practicable. Most of the compounds added to the material in the course of finishing may be removed the oil compounds by extraction with ether, and the soluble substances by extraction with distilled water or soap solutions. Decolorization is then brought about by treatment with hypochlorous acid.

The wetted sample of fabric is suspended in a suitable partially enclosed receiver containing a small quantity of bleaching powder on which there is allowed to fall drop by drop a dilute solution of either sulphuric or hydrochloric acid. The sample is allowed to remain under the influence of the hypochlorous acid formed until it becomes almost white. Upon decolorization, the material is washed several times with water, and subsequently dried. When fabrics composed of mixtures of cotton and wool are under consideration, the two fibres should be separated and treated singly.

Cleaning Machinery.

From the Fleshermen's Review.

Dissolve one pound of concentrated lye in about two gallons of water, and with a mop saturate the engine with the liquid, being careful that it does not get into the oil-holes of the journals and bearings. After the lye has eaten all the grease and gum from the surfaces, clean perfectly by scraping and brushing, and after the iron is dry and free from grease, apply a thin coat of lead paint. After this is thoroughly "set," paint the iron a deep black and varnish heavily. Coloring, striping or decorating should be done before varnishing. Then the engine can be easily and quickly cleaned with a dusting cloth, and escaped oil can be wiped off very easily.

Handling Polished Steel Goods.

From the Brass World.

The handling of polished steel goods by factory workmen has always been a troublesome feature on account of the formation of finger marks and finally rust. There are many operations in the factory in which it is necessary to handle polished steel, and in the summer time particularly, when the hands perspire to a greater extent than in the winter, the annoyance is increased. In the majority of instances it is impossible to oil or grease the steel.

A practice has been in existence among some factories for many years of coating the hands with whiting while handling the steel. Although old, the method is not generally known. The whiting is ground chalk and a small bag of it is made up with water and allowed to dry.

This is applied to the hands from time to time. The steel will not rust when handled under such conditions. The whiting has no effect upon the hands, as it is an inert substance.

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