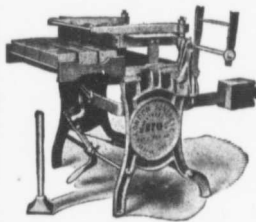


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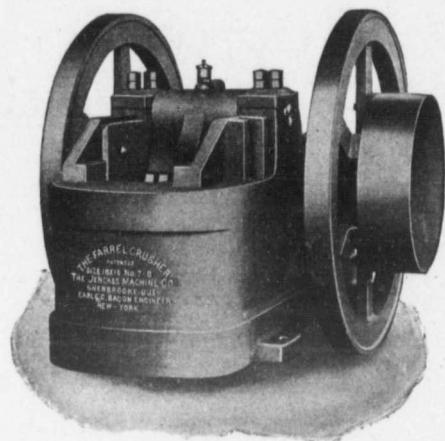
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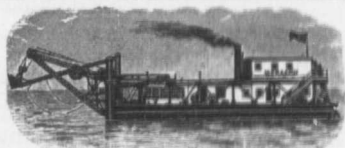
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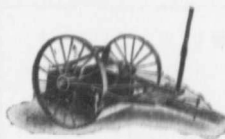
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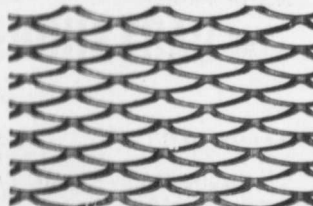
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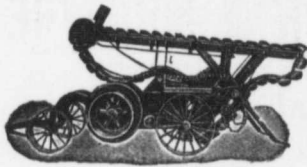
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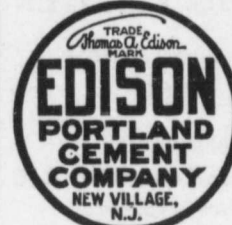


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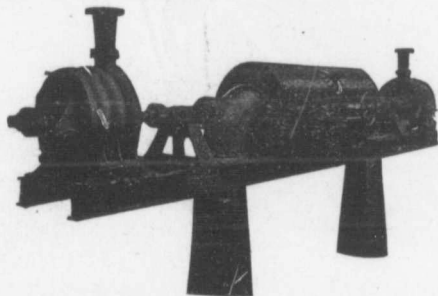
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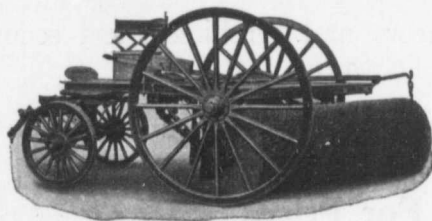
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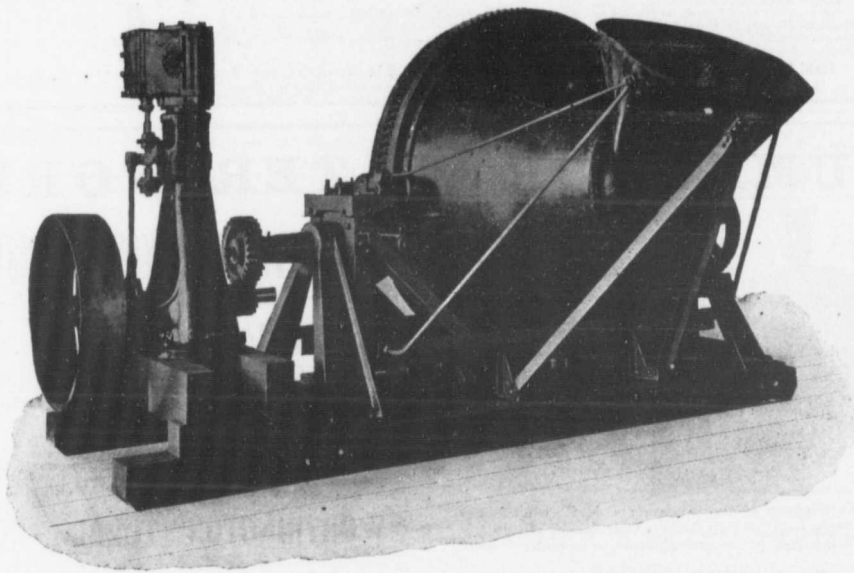
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Authorities tell us that nine-tenths of our enormous annual fire loss is directly attributable to imperfect construction, that even in our so-called great fireproof buildings architects make such blunders, as endanger the entire investment. The greatest care and much expense will be placed in the use of high class materials all through a building, but some window, for instance, will be left unprotected and in a particularly vulnerable place that offers easy ingress to external fire.

This may in some cases be true where an incompetent architect is employed, but certainly is not generally the case in our large cities. Only occasionally do we hear of serious errors from architectural incompetency.

On the other hand, instance are many where buildings in small towns are notoriously unsafe and have remained so for years. In such cases there is usually no one to take the initiative in forcing obviously necessary alterations and, until an unmistakable warning either with or without attendant loss of life occurs, no steps are taken to make improvements. An instance comes to mind of a theatre in a small Ontario town which is a notoriously unsubstantial structure, used only a score or so of times a year and for that reason deemed unworthy of serious attention. The building is a large brick structure, occupying the corner of the main street, and furnishing an ideal centre of conflagration for the demolition of the entire business section of the town. A retail liquor business is conducted on the main floor and adjoining it at one time was a bicycle repair shop furnished with the usual supply of oily rags and supplies of oil and gasoline. The theatre itself was on more than one occasion the scene of an incipient conflagration owing to defective chimneys—the building is heated with wood stoves.

It was on another point, however, that the builder or proprietor showed a lack of forethought. In the case of fire breaking out the only means of escape from the balcony of this theatre was through a narrow door and thence down a flight of winding stairs, into which, about half way down, opened the only means of egress from the main floor. In time of fire panic two streams of humanity would have poured down these two staircases, have met in full flight on a narrow platform, and there have been the victims of a tragedy similar to that which recently took place at Barnsley, England.

Action, we understand, has within the past month been taken by the town council in this particular instance, and the owner of the theatre instructed to provide better fire escape accommodation. Whether or not this will or can be done is problematical.

The instance cited is by no means without a parallel. The theatres, schools and churches throughout this

country have, in very few cases indeed, been so constructed as to permit of easy fire escape. The blame rests with the low standard of building that has ruled in our smaller municipalities and which apparently is only jolted into a more up-to-date form by occasional world-startling calamities. Here assuredly is a common meeting ground for architects and contractors and one on which much can be decided for the public weal.

Scotch or Canadian Brick.

Considerable comment has been roused in Montreal over a report that the provincial government have decided that the material to be employed in the construction of the new Montreal jail shall be Scotch brick. Local brick makers have been taking a great deal of interest in the contract for this building, as it will be a large one, and are most indignant over the decision of the government. It is stated on good authority that the advisers of the provincial government have unanimously agreed that the brick produced in the neighborhood of Montreal is fully equal to the best Scotch brick in every respect, with the possible exception of that of colour, and that the local product is also the cheapest. If the building was to be located on an important street in Montreal the color question, it is argued, might be entitled to respect, but as the building is to be erected at the Back river this consideration counts but for little, especially as the color of the home article is not in the least displeasing. The color argument, it is further urged, must fall to the ground when the fact is taken into consideration that the employment of home brick would mean a great deal of employment for home labor at a time when it requires it, whereas the use of the Scotch article would leave the country just that much poorer. The hope is expressed that Mr. Gouin and his colleagues will alter their decision.

Advertising Pays.

There is no advertising like newspaper advertising. The merchant who tries the bill board or the fancy dodger, if he tests the matter thoroughly and conclusively, will find that the newspaper advertisement is the very best that there is. The big advertisers confine themselves exclusively to the newspapers. No merchant ever increased his business by bill poster advertising. A few weeks ago there was a strike in Butte, and for some days no newspaper appeared on the streets of that city. There was nothing for the advertisers to do but to resort to the bill board and the street bill. The result was that business fell off there from twenty to fifty per cent. The decline was attributed solely to the fact that they had no newspapers to act as advertising mediums.—Calgary Albertan.

Civic Undertakings Should be Commenced Early.

For some years past building has been the prime source of employment, and the discouraging feature of the outlook, therefore, is that this will show in all probability an enormous falling off for 1908. Attention is called to the matter here in order to suggest that the municipal authorities should at this crisis see that all the legitimate civic enterprises which can be gone on with now are pushed to an early start. If sewers, roadways, and concrete sidewalks have to be constructed, the greatest effort should be made to set them in motion as early in the year as possible. The wisdom of prosecuting large public works during seasons of depression is universally admitted. Public bodies, such as national, provincial and municipal governments, which are not subject to the limitations and timidities of individuals, are in duty bound to be most active when the private employer has drawn into his shell and has ceased to be a dominating factor in the labor market.

This is not an incitement to extravagance. The work undertaken should be useful and needed works. It may be that during such a time the cost of money may be above the nor-

mal, but a city of the standing of Toronto, or states in so sound a financial position as the Province and the Dominion, would be able to procure money for such works on good terms. If the interest account were heavier than in times of cheaper money, the plentifulness of labor would more than make up the difference. Let there be no cessation in public works, but, on the contrary, an earnest undertaking of them.

The litigation which has fallen on the City Hall may have a tendency to delay the pushing of business up there, but it should not. It is, of course, vexatious, and should be treated so, and it may be hoped that it will not be allowed to delay any civic undertaking.—The "Globe."

Toronto Builders Protest.

Whether the Toronto City Architect shall have work done by day labor on his own figures or shall tender and take his chance in the same way as the City Engineer was discussed by the Board of Control and a large deputation from the Builders' Exchange on Friday last.

The Board approved of the latter principle, but cannot interfere in the case of the ferry shed—the cause of the trouble—as work has been begun already by the City Architect.

Messrs. R. G. Kirby, Arthur Dinnis and Samuel Hughes were the speakers.

"We ask you to give you a chance to do business in Toronto. If work is scarce for the workingman, business is scarce for the business men," said Mr. Dinnis. "The architect is not a builder, and there should be a man to look after his work and keep a strict account."

Restrain Immigration.

Our friends in the motherland are getting at the facts as to the condition of the labor market in Canada. The Belfast "Evening Telegraph" with commendable enterprise publishes in its issue of February 1 statements from many prominent people in Ontario, telling of the actual conditions. Among the writers are Archbishop Sweatman, Mayor Oliver of

Toronto, Mayor Stewart of Hamilton, and Mr. J. A. Nelles, secretary of the London Board of Trade. The frank admission that the labor market, especially for unskilled workers who will not go on the land, is temporarily overstocked can do nothing but good.

Get in Touch with the West.

The failure of Eastern Canada to realize the necessity of keeping intimately in touch with the West in commercial matters is pointed out by the Winnipeg "Commercial" in the following language:

If the capitalists of Eastern Canada do not make haste to claim the market afforded by these provinces, they will before long find that they will have to come here in the face of strong United States competition. At the recent meeting of the citizens of Winnipeg, called to belie the pessimists, Consul Jones made a stirring speech, in which he said that the United States manufacturers were rapidly becoming more appreciative of the great opportunities in this growing market, and he gave us to understand that it would not be the want of effort on his part if they did not receive the greatest encouragement to branch out here without delay. Already we have quite a few branches of United States firms in Winnipeg and throughout the West generally, who are somewhat surprised that the Eastern Canadian is not more alive to the chances offering in Central and Western Canada. It is up to some of our Eastern brothers to get more acquainted with this part of the Dominion, and also get the Western storekeepers to become more familiar with the products of the Canadian manufacturer. These provinces are immense consumers, and some one must make and sell the goods.

The production of nails is enormous. In a recent issue of the "Iron Age" there is a table showing the yearly production for ten years. The maximum production of cut nails in the United States was reached in 1886 when it was 8,160,973 kegs, while the maximum of wire nails was reached in 1904, viz., 11,926,661 kegs.

Reinforced Concrete from the Contractor's Standpoint.*

The general problem before the contractor in reinforced concrete is to make the best possible reinforced concrete at the least possible cost. The first part of this discussion will deal with methods to be followed and precautions to be observed in order to attain excellence of workmanship; the second part, with methods to be followed in order to attain this excellence cheaply.

To make the best possible reinforced concrete it is necessary:

1. That the forms should be strongly built, smoothly finished, and as nearly as possible watertight; and should be left in place until the concrete is self-supporting.

2. That the reinforcement should be designed to relieve the concrete of all stresses which concrete cannot safely withstand, and to be amply protected from fire and weather by concrete on all sides; that the reinforcement should be so securely fixed in place before concreting that the concreting will not disturb it.

3. That the concrete should be mixed and placed in such a way that the final product will be homogeneous and without voids.

First.—Forms should be built of matched and dressed lumber and should be greased to make them part easily from the concrete. Their construction will be described in some detail in the second half of this paper. The length of time which should be allowed to elapse before removing forms depends upon two factors, the weather and the load to which the member in question will be subjected upon removal of the forms. The fact that the concrete sets more rapidly the warmer the weather needs no elaboration. It is, however, never out of place to utter a warning against taking risks with concrete in cold weather. I suggest that very valuable information might be obtained from compressive tests on a series of concrete blocks, No. 1 being kept at a temperature of 30 degrees for one

month after making, and being tested; No. 2 at 35 degrees; No. 3 at 40 degrees, etc. Scratching concrete with a knife gives one a rough idea of its strength, providing one scratches often enough to become thoroughly familiar with the behavior of concrete under the knife. With regard to the second factor influencing the time which should elapse before removing forms, it may be said in general that the nearer the load to be sustained approaches the load for which the member was designed, the longer the forms must remain. Thus, the forms for an over-hanging cornice should remain in place longer than the forms for almost any other member, because the dead weight of the cornice is a very large percentage of the total weight which it is designed to carry. By similar reasoning, roof forms should remain longer than floor forms; floor forms longer than column forms; column forms in the top storey of a building longer than column forms in a lower storey; and column forms in general longer than footing forms.

It is very important that forms should be so designed that the column forms may be removed without in any way disturbing the supports of the beams and girders bearing on these columns. In this way a defect in a column may be detected and remedied before any load is brought to bear upon the column. In removing beam and girder forms, the posts should be removed from only one beam or girder at a time, and as soon as the form for this beam or girder is removed, the posts should be immediately replaced. By this procedure, danger of failure of concrete through poor workmanship is much diminished, as a defective member is supported by the members on either side of it until the defect may be remedied. The practice of removing all the posts under a floor at the end of a given period—one, two, or three weeks—without pausing to remove the forms one at a time, examine the workmanship, and replace the posts, cannot be too

strongly condemned; both because of the possibility of defective workmanship, and because the concrete floor, even if not defective, may not be strong enough to carry in addition to its own weight the weight of the one or two floors which may, by the time the forms are removed, have been constructed above it.

There is less danger in taking down column forms when the concrete is thirty-six hours old, and floor forms when the concrete is five days old, if the posts of each member are removed separately, and as soon as possible replaced, than there is in knocking out all the posts under a large piece of floor in three weeks. Legislators who frame laws aiming at safety in concrete construction should bear this in mind.

It is of first importance that the foreman in charge of removing forms should be of a high order of intelligence, and a man who can be relied upon to obey orders literally, for the reason that a mistake on his part is more likely to cause damage to life and property than a mistake on the part of any other foreman.

Second.—Reinforcement should be designed to take all tensile stresses which occur in a reinforced concrete structure. Whether the reinforcement shall carry shearing or compressive stresses depends upon the conditions in each particular case.

Tensile stresses occur horizontally in the bottom of beams, and, in the case of continuous beams, in the top of the beams over their supports. They occur diagonally in every part of a beam except the top and bottom. The horizontal tensile stresses are best taken—as most authorities are now agreed—by diagonal bars. As the horizontal tension is less at the end of a beam than in the centre, it is obvious that if there are two or more bars in a beam, one of the bars which takes the horizontal stress at the middle of the beam may be deflected to take the diagonal tension near the ends of the beam, and in the case of continuous beams, the horizontal tension over the supports. Thus are developed the familiar bent bars now in common use.

Shearing stresses occur chiefly near

*Paper read before the National Cement Users' Association by Mr. H. H. Fox, of the Turner Construction Co., New York.

the supports of beams. The vertical shear is generally taken partly by the concrete and partly by the tension bars which run over the support. Horizontal shear is taken partly by the concrete, partly by the diagonal tension bars, and partly by stirrups.

Compressive stresses occur chiefly in the tops of beams and in columns. Compression in beams is almost always taken by the concrete alone. Compression in columns is taken partly by the concrete, partly by vertical steel bars. Vertical compression in columns induces a horizontal tension or bursting stress. Concrete is so weak in tension that a concrete column without reinforcement usually fails in tension, either by bursting or by buckling. The tendency to buckle is best resisted by vertical steel bars; the tendency to burst, by steel hoops or a steel spiral near the surface of the column.

One method of holding steel in place in a typical beam containing three tension bars is by stirrups that touch the forms only at two points and are, therefore, well protected against fire. The stirrup should not be relied upon to support the tension bars in place, but hangers should be used. As these hangers are of no further value after the concrete is in place, the fact that they are supported directly on the forms, and are thus not fireproofed is of no importance. The middle portion of the tension bars in beams and girders is thus held in place by hangers; the ends are held in place by being laced with wire to one another and to the vertical reinforcement in the columns. The bars in the floor slab are supported off the forms as follows: In order to obtain continuous action over beams every alternate tension bar in the floor slab is sprung up where it crosses a beam, being supported at the edge of each beam by a short piece of band iron about 1 1-2 inches narrower than the thickness of the floor slab, and bent to an angle of about 60 degrees, so that it will stand on edge by itself. In the middle of each span a bar runs at right angles to the tension bars, on top of the tension bars, and is held at any desired distance above the floor by staples into the floor cover and by

the lifting tendency of the tension bars which are sprung up over the beams. The other tension bars are then raised from the floor by lacing them with wire to this central bar.

To insure fireproofing in columns, four sticks are used in tamping the concrete columns, and these sticks are run down one on each side of the column between the hoop or spiral reinforcement and the form, thus insuring an amount of fireproofing equal at least to the thickness of the stick. The vertical reinforcement is placed inside the hoop or spiral reinforcement.

Third.—How to mix concrete well, by hand or machine, needs no discussion. How to place it well is another matter. In the case of floors the trick is simple. Concrete should not, unless it is absolutely necessary, be dumped from a wheelbarrow directly against the form but should be dumped on the soft concrete already in place. The mortar, flowing more freely than the stone, keeps always ahead of the mass, and stone falling in this mortar find a perfect bed; whereas if a barrowful of concrete is dumped into a dry beam the stone may become jammed between the forms and the steel and form a pocket into which the mortar will not enter.

A few years ago I visited a very large concrete job on which the old-fashioned specifications were in force—that concrete must be placed in thin layers. Nobody on the job seemed to know the trick of placing concrete properly; and consequently the contractor, in order to obtain smooth workmanship, was placing an inch or two of clear mortar in the bottom of all beams and girders, before filling them with concrete. The expense entailed by this may be imagined.

The place to dump the first barrowful of concrete when starting a piece of floor is either on the floor slab or in a column. As long as the mass is kept moving it will be homogeneous, but if it is allowed to set in a diagonal shape two evil results will follow: First, the cement and water, the most fluid part of the mass, will flow forward leaving behind a layer consisting chiefly of sand, with which the concrete, subsequently placed, will

not mix, and which has very little value as fireproofing; second, the scum which rises to the surface of wet concrete, containing as it does the finest dust present in the sand and stone, sets with a very smooth, glassy surface to which fresh concrete will not adhere. This joint, therefore, if work is stopped on it long enough to allow the scum to harden, will be very weak in shear and tension.

In concreting columns it is necessary to proceed slowly at the bottom of the column and to tamp the first foot with great care. After the mortar flushes to the surface over the entire section of the column, there is little danger of voids being left in the part of the column above the first foot if a sufficiently wet mixture is used. Walls should be similarly handled.

Economy in Handling Materials.—The exterior column is usually made square for architectural reasons. The interior column is octagonal, partly for architectural reasons, partly to save concrete. This saving is due to the fact that in a column reinforced with a spiral, the concrete outside the spiral is not figured as adding compressive strength to the column, and, therefore, if this column is square, the concrete in its four corners is wasted. Of course, the question arises whether the concrete saved pays for the additional carpenter work. As a rule, the two items almost counter-balance each other, so that the matter of appearance is more important than the matter of economy.

Two opposite sides of the column are held together by bolts; the other two opposite sides, by hardwood wedges between the bolts and the forms as close as possible to the end of the bolt. In some cases the sides are made up of narrow strips, to facilitate the reduction in size of the columns from floor to floor. In warm weather there is no need of having more column forms than one complete set for one storey, even when work is progressing at the rate of a storey in five or six days. In a ten-storey building each column form is then used ten times, once in each storey. Each of these narrow strips represents the reduction in diameter

of the column from one storey to the next. It is, of course, much cheaper to have these strips ripped beforehand in the mill than to have a carpenter rip off a strip for each successive storey. The outside and inside of the exterior column form are not made up of narrow strips for the reason that exterior columns are usually the same width from basement to roof. To reduce the section of an exterior column only the thickness is reduced.

In beam work the "girder" bottom" is supported on the horizontal clamps of the column form, and the beam forms on the girder bottom. Thus all the forms of a floor may be erected before any posts are put in. At any time after the beams are in place the posts are put in and wedged up without any lateral bracing whatever. By this method time and labor are saved. If 2-inch lumber is used for beams, the beams must be at least 2 inches shallower than the girders, in order to allow the beam forms to be supported by the girder bottom.

A wedge-shaped piece in the form of a "key" is inserted to facilitate removal of forms. The flat cover or panel which supports the floor slab is better than the box-shaped type, for the reason that any slight errors in the line are taken up at the junction between cover and beam side, and a slight variation in this dimension is not conspicuous.

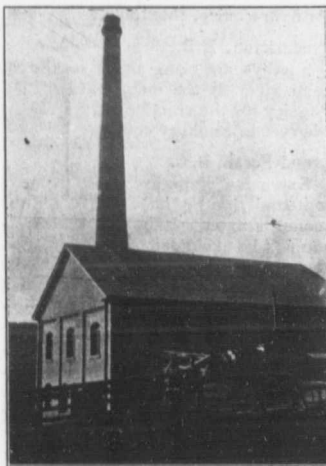
In removing forms, the column forms are first removed. As has been said, the details about the tops of column forms should be so designed that they may be removed without in any way disturbing the beam and girder forms. Next, the posts are taken from under the girder. The girder bottom then drops, and the posts are immediately replaced. The nails are drawn from the key, which is nailed only to the girder side; the key is knocked out, the posts are taken from under the beam, the so-called "spreaders" are knocked from under the cover, and the beam form comes down in one piece. The girder sides, which are beveled at the ends, come out easily as does also the cover, which is beveled on all four edges.

(Continued on page 23.)

Vancouver's New Incinerator Plant.

In Vancouver recently, at the invitation of the representative of Heenan & Froude, Constructing Engineer Slatter, the city council, and the officials interested, were invited to the new incinerator to make a thorough inspection, along with delegations from Victoria and Winnipeg. Colonel C. H. Ruttan, city engineer, and Mr. Greig, who is an expert on such matters, came from the Prairie capital. From Victoria there were Ald. Henderson, chairman of the streets committee; City Engineer C. H. Topp, and Mr. M. Hutchinson, superintendent of the electric lighting department.

The Victoria council are thinking



VANCOUVER INCINERATOR INSTALLED BY HEENAN & FROUDE.

of putting in an incinerator, hence their interest.

Col. Ruttan expressed the opinion this morning that Vancouver was wise in putting in a small plant in one section of the city, thus having the reserve of another plant in another section, with a view to saving haulage.

The visitors had a very thorough chance of inspecting the plant in all its workings and also the subsidiary fumigating plant installed at the instigation of Medical Health Officer Underhill. They saw the sloppy garbage go in and they saw the clinkers, about 36 per cent. of the whole, with-

drawn. They noticed the dreadful smell of the loaded wagons and the sweetness of the "finished product." The finished product, however, is not recommended for health food, even by the officials in charge. It is at present found useful in filling in around the premises, and later may be used under cement walks.

Covering for Underground Steam Pipes.

Experience has shown that a good steam-pipe covering for underground use is made of two layers of non-conducting wood (white pine free from all sap), bound together by steel wire and separated by two layers of heavy non-conducting paper. The insulating character of the covering is also greatly increased by the presence of a thin layer of air between each layer of wood and paper. On low-pressure steam and hot water pipes this covering, unlined, gives good results, but if it is to be used on high-pressure steam pipes it should be lined with asbestos, in which case, no matter how high the pressure of steam, no other covering or wrapping is necessary.—"Power."

To Test Steel and Iron.

Nitric acid will produce a black spot on steel—the darker the spot the harder the steel. Iron, on the contrary, remains bright if touched with nitric acid. Good steel in its soft state has a curved fracture and a uniform gray lustre; in its hard state a dull, silvery, uniform white. Cracks, threads, or sparkling particles denote bad quality.

Good steel will not bear a white heat without falling to pieces, and will crumble under the hammer at a bright red heat, while at a middling heat it may be drawn out under the hammer to a fine point.

Engineers' Club of Toronto.

A club building which will be occupied by a number of scientific societies may be built as the result of a project which has developed from the move made recently by the Engineers' Club, 96 King street west, for new quarters.

Contracts Department

News of Special Interest to Contractors, Engineers, Manufacturers and Dealers in Building Supplies.

CONTRACTS OPEN.

Alameda, Sask.

The proprietor of the American Hotel, which was recently destroyed by fire, has submitted plans to the town council for a new building.

Belleville, Ont.

A factory has been established in this city by a joint stock company known as Brass & Steel Goods, Limited, capitalized at \$150,000.

Bridgeburg, Ont.

At a large meeting convened recently to discuss the subject of a better communication between Bridgeburg and Buffalo over the International bridge, it was decided to take measures to enforce the compliance of the International Bridge Company's charter and to secure the building of a new foot and driveway.

Brockville, Ont.

Tenders will be received by M. J. Connolly, Mallcroytown, Ont., up to February 29th for the construction of a bridge at Jones' Creek. Specifications and further particulars on application.

Bruce Mines, Ont.

It is understood that negotiations will shortly be reopened between the Government and an English railroad syndicate looking to the completion of the railway from this town to a point on the main line of the C.P.R., probably at Chappleau.

Calgary, Alta.

H. E. Gillis, City Clerk, invites tenders up to March 1st for cast iron water pipe, sewer pipe, lead pipe, cement and other materials. Specifications at office of City Engineer.

Cainsville, Ont.

A new steel bridge with heavy concrete abutments will be erected here by the Toronto, Hamilton & Buffalo Railway Company.

Daysland, Alta.

Camille Davis has come to an arrangement with the town by which he will establish a packing plant here this season and expend \$10,000 upon the erection and equipment of a plant.

Dundas, Ont.

The special committee of the coun-

cil have recommended the acceptance of the Carnegie grant of \$10,000 for the erection of a public library.

Dunrea, Man.

J. H. Putnam, treasurer of Riverside municipality, will receive tenders up to March 10th for the construction of a steel highway bridge of two 100-foot spans across the Souris river. Tenders will be received for steel or reinforced concrete construction. Specifications may be obtained at Chief Engineer's office, Department of Public Works, Winnipeg, or at Mr. Putnam's office, this town.

Fredericton, N.B.

Surveys are being made on the St. John river at the instigation of Dr. Pugsley for the erection of several new wharves in Sunbury county.

Grand Forks, B. C.

Extensive plans are stated to be in contemplation by the C. P. R. for the coming season. It is said that \$70,000 will be expended upon the erection of a fifteen-stall roundhouse and coal chutes, \$40,000 for a passenger station and offices, and \$40,000 for other improvements.

It is also stated that the C.P.R. are about to lay out 160 acres of unsurveyed land in the west end of the city in one acre lots for residential building purposes.

Preparations are said to be under way for the development of a large timber area in Kettle river valley. Several big sawmills will be erected this spring between this city and Franklin camp.

Goderich, Ont.

W. A. McKim, town clerk, wants tenders for \$50,000 4½ per cent twenty year debentures of \$3,843.80 each.

Gravenhurst, Ont.

It is rumored that the G.T.R. intend to build a large sanitarium on the shore of Gull Lake and that the station will be removed to a site near the proposed building.

Halifax, N.S.

James Fairfax, the proprietor of the Queen hotel, intends making an addition of forty steel-constructed fireproof rooms.

Hamilton, Ont.

Mayor Stewart is forwarding a pro-

ject for the erection of a big hall for conventions. The site most favored for the proposed building is that of the Central Presbyterian church. It is likely that something definite will be settled in the near future.

The Board of Education have referred back for further report the recommendation of the building committee for the enlargement of the Sophia street school, owing to a claim put forward by trustee Armstrong that the need for enlargement is greatest in the north end.

Hastings, Ont.

Bird & Sons, manufacturers of paroid roofing, are understood to be contemplating the establishment of a factory in this town.

Kingston, Ont.

Henry P. Smith, architect, this city, is preparing plans for the erection of an orphanage and novitiate building at St. Mary's-on-the-Lake upon a site owned by the House of Providence.

London, Ont.

Colborne street Methodist church is about to be enlarged at a cost of \$15,000.

A. E. Nutter, City Architect, will be asked to prepare plans for an addition of four rooms to the Lorne avenue school. The sanitary arrangements and ventilation of Talbot street school are to be overhauled at an early date.

City Architect Nutter's plans for the new isolation hospital to cost \$53,000 have been finally revised by the special hospital committee and tenders will be called for upon completion of the remaining details.

Medicine Hat, Alta.

It is stated that the C.P.R. will erect a large plant here in the near future for the purpose of charging gas tanks on passenger trains with natural gas.

Montreal, Que.

A new church is to be erected on Mance street this spring by the German Lutherans.

At the next session of the Quebec legislature application will be made for the incorporation of the Hospital St. Justin, for sick children.

J. P. Dickson, of the Eastern Canada Hockey League, announces that a

new covered hockey rink will be built as soon as possible.

Tenders are now being taken for the construction of the new stock yards which the Canadian Pacific Railway intend establishing in this city at a cost of more than a million dollars.

The Beyer Peacock Company, London, England, builders of locomotives, are understood to have secured a site near this city with a view to the establishment of a Canadian branch factory.

Another girls' school is badly needed at Point St. Charles, the Sisters' school on Wellington street being totally inadequate for the growing needs of the locality, and the congregation of Notre Dame have offered to put up a new \$30,000 building at their own expense provided that the board of catholic school commissioners make them an annual allowance of \$1,000. The enlargement of Meilleur school is also being considered and this matter together with the other project has been referred to the finance committee.

It is now regarded as certain that the erection of the proposed new locomotive works at Lachine will be commenced this spring. The project was formed by the Trust & Loan Company, of Montreal, and is backed by the Beyer-Peacock Company, of London, Eng. Sir Vincent Caillard, President of the former concern and chairman of the latter, is stated to be at the head of the new undertaking and is reported to have secured a sum of \$60,000 for the purchase of a site near this city.

Moosomin, Sask.

Tenders are invited by F. J. Robinson, Deputy Commissioner, Department of Public Works, Regina, up to March 2nd for the erection of a provincial jail building. Plans and specifications may be seen on application to Darling & Pearson, architects, Regina, and at the Department.

Nelson, B. C.

An extension of the street railway system is being planned with a view to securing a belt line.

Newburg, Ont.

Notice is given by B. G. Hamm that the roads and bridges' committee of the county of Lennox and Addington will meet at this place on February 29 at 11 a.m., to receive plans, specifications and tenders for the erection of a steel bridge with stone or cement abutments, or an arch stone or cement bridge reinforced with steel, span about 60 feet.

Ottawa, Ont.

Chief Provost, of the fire department, is recommending the purchase of the following apparatus: New engine, aerial truck, combination chemical

engine and hose wagon, water tower, and new stations for York street and at No. 6.

The building committee of the public school board are asking the finance committee to provide ten thousand dollars this year for repairs to school buildings and to issue debentures of \$100,000 to cover the cost of two additions. The proposed additions are to the Cambridge and Elgin street schools and are both for eight rooms.

Peterborough, Ont.

A bylaw is being submitted to the Ontario Railway and Municipal Board providing for the issue of debentures amounting to \$10,000 for extensions to the waterworks.

Port Arthur, Ont.

A new school district for McIntyre has been organized and the trustees are looking for a suitable building site.

Port Colborne, Ont.

The local authorities have opened negotiations with a smelting company.

Port Stanley, Ont.

A deputation from the board of trade recently waited upon the council in regard to the proposed installation of a waterworks system and a public meeting will be held in this connection in the near future.

Prince Rupert, B. C.

Following a visit recently paid by E. J. Earling, President of the Chicago, Milwaukee & St. Paul Railway, and other associates, it is announced that construction work is to be commenced early this spring at Cumshwa Inlet on a sawmill to cost \$400,000, to be erected by the Moresby Island Lumber Company, an American concern.

Brett & Hall, landscape architects, of Boston, Mass., have been awarded the contract for the general plans of the model city to be built here by the G. T. P. There has already been constructed a dock a thousand feet long on the water front and it is planned to extend this for a much longer distance. Along this dock great elevators will be built for the accommodation of the trains which will bring the products of the great grain sections which the new road will serve. A railroad will be built to cross from the mainland to Porpoise island and then to Kaien island by means of bridges, the first of which will be about a quarter of a mile in length and the second some 200 feet long. It is understood to be the plan to have the railroad skirt the southwestern shore of Kaien Island on piles elevated some twenty feet above high water, the coast being too steep and rocky for the location of the tracks.

Quebec, Que.

Charles Cloutier will erect modern business premises and is about to call for tenders.

Regina, Sask.

A new \$5,000 warehouse will be erected here this spring by the Petrie Manufacturing Company, of Hamilton.

F. J. Robinson, Deputy Commissioner of Public Works, wants tenders up to February 24th for the construction of a reinforced concrete bridge and dam over the Wascana creek on Albert street. Plans and specifications may be seen on application.

Sarnia, Ont.

It is reported that the town council are negotiating for the establishment of a branch factory by an American glass works.

St. John, N. B.

Extensions are to be made to the Portland Methodist church in which electric light will also be installed.

Stratford, Ont.

Architect Russell has been engaged by the members of the Lutheran body to prepare plans for a new church to be erected at the corner of Erie and St. David streets.

The finance committees of the city council and the public school board are contemplating the erection of a new \$60,000 school building.

Sutton, Ont.

We are advised by H. A. Parsons, Secretary-Treasurer, that on March 10th the ratepayers will vote upon a bylaw to raise \$7,500 for the installation of an electric light system.

Toronto, Ont.

City Engineer Rust, reporting to the Works Committee, estimates the cost of a bridge across the river Don at Wilton avenue at \$185,000.

An auditorium will be erected in front of College street Methodist church at a cost of \$20,000.

The Westmoreland avenue church, recently destroyed by fire, will be rebuilt this season at an estimated cost of from \$35,000 to \$45,000.

Tenders are invited by Joseph Oliver, Chairman of the Board of Control, up to February 25th for dredging slips. Specifications at office of City Engineer.

Simpson & Young, architects, 17 Toronto street, will receive tenders up to February 26 for five brick houses on Cameron Place. The same firm are also taking tenders this week for the construction of a \$3,500 verandah for a residence at Rosedale.

Tenders will be received by Joseph Oliver, Chairman of the Board of Control, up to February 25th for stable fittings to the Central fire hall, according to plans at office of City Architect.

The Fort entrance to the Exhibition ground has been definitely selected by the Parks Committee, and a recom-

mentation will be submitted to the city council calling for the construction of the necessary work, including bridges, to be available for the next exhibition.

The following pavements have been recommended by the City Engineer: Asphalt, Wallace avenue, Dufferin to Lansdowne, \$20,164; Broadview avenue, Queen street to Eastern avenue, \$5,912; Essex street, Christie to Shaw, \$7,685; bitulithic, Binscarth road, Glen road to east end, \$9,419; bricks Howard Park avenue, Dundas to Indian road, \$14,446; Austin avenue, Pape to east end, \$4,830.

Recent building permits include: Thos. McIlwaine, 2-storey brick dwelling, corner Marion street and Roncesvalles avenue, \$3,000; Robert Strothert, 2-storey brick dwelling, Crawford street, \$4,000; G. Turner, 2-storey store and dwelling, Hallam street, \$3,000; L. Grant, 2-storey brick dwelling, McKenzie avenue, \$4,000; W. J. Armstrong, 3 detached 2-storey brick dwellings, Millicent street, \$7,200; Philip Jamieson, alterations to store, Yonge street, \$2,000; Bachrack Brothers, alterations to store front, Yonge street, \$2,000; T. D. Liddell & Son, pair 2-storey semi-detached brick dwellings, corner Golden and Silver avenues, \$3,500; R. Lankin, 2 pair 2-storey semi-detached brick veneered front and rough cast dwellings, Badgeron avenue, \$6,400; John Northway & Son, alterations to store, Yonge street, \$2,000; R. C. Evans, 2-storey and attic brick dwelling, Huron street, \$3,500; Lake & Dyer, pair 2-storey brick dwellings, Park road, \$6,600; C. Lorden, 4 attached 2-storey brick dwellings, University avenue, \$10,000.

Vancouver, B.C.

W. Owen will shortly commence the erection of a store and assembly room on First street.

The hospital board of North Vancouver are discussing the advisability of securing plans for a new hospital building.

The officials of Wesley church are contemplating the enlargement of their premises and the erection of a parsonage.

A three-storey brick office block is to be erected by the National Finance Company, Limited, at the corner of Homer and Gender streets.

Grant & Henderson, architects, this city, are busily engaged upon the plans for the new 3-storey wing for the General Hospital to cost \$90,000.

The British Canadian Pulp Wood & Paper Company will immediately call for tenders for the development of 5,000 horse power on Rainy river opposite Gambier Island.

Recent building permits include:—W. Murray, frame dwelling, Fourteenth avenue, \$2,000; M. Smith, frame dwelling, Second avenue, \$3,000; H. Hampton, frame dwelling, Second avenue, \$3,500; J. Burns, brick addition, Hastings street, \$20,000; S. S. Rhinehart, apartment building, corner Smith and Hornby, \$10,000.

W. I. Farrell and others are seeking permission to span the entrance to the Narrows Inlet with a cable structure after the style of the Capilano Canyon bridge and it is hoped to have the work completed by May 24th next. The proposed bridge will have a total span of 1,600 feet and will be 270 feet high and 14 feet wide, with three cables from which will hang the floor of the foot bridge.

It is ascertained from J. A. Waddell that no time is to be wasted upon preliminaries of the False Creek bridges. The engineer states that he will do everything in his power to rush the work and thinks that there is a good chance of completing the structures within a year. He considers that the market conditions are now most favorable for the undertaking. Tenders for the foundations will probably be called for right away as the plans for the bridges proper are about completed.

Vaudreuil, Que.

In the recent fatal explosion at the works of the Standard Explosives, Limited, on Ile Perrot, the nitro-glycerine factory and other buildings were destroyed.

Victoria, B.C.

An active campaign is about to be launched to raise funds for a new Y.M.C.A. institute.

It is announced that the E. & N. Railway Company will commence work at once upon the building of their new terminals on the site purchased from the Albion Iron Works.

W. W. Northcott, City Purchasing Agent, will receive tenders up to March 16th for supply of following cast iron water pipe:—33,000 feet 12-inch, 18,000 feet 8-inch, 36,500 feet 6-inch and 25,000 feet 4-inch.

Matthew Hutchinson, superintendent of the city lighting department, has just issued his annual report, in which he recommends the replacing of the older types of lamps and machinery, also other extensions.

Recommendations are to be made to the council by the fire wardens calling for a most up-to-date fire-fighting apparatus. Sea water will be employed according to the plan proposed and two large electric pumps each having a capacity of 4,000,000 gallons will be required. \$25,000 will be expended upon new apparatus. A new motor

engine will be purchased and two new firehalls constructed at a cost of \$10,000. The plans for salt water supply involve an expenditure of \$60,000.

Walkerville, Ont.

It is stated that plans for the construction of a steel bridge over the Grand Trunk Railway tracks on Sandwich street have been completed and approved by the G. T. R. and other lines interested. Particulars obtainable of B. B. Kelliher, Chief Engineer, G.T.R., Montreal.

Winnipeg, Man.

City Engineer Ruttan is figuring on the cost of securing a pipe testing apparatus.

The Board of Control have been instructed to take tenders for a new pump for No. 5 well according to the report of the city engineer. Estimated cost \$12,000.

Smith & Bruce are preparing plans for the enlargement of St. Stephen's church. The same architects have considerable other work on hand, including plans for the remodeling of a large six-storey block in this city and for the erection of a new church.

L. T. Bristow, architect, this city, has completed plans for the new Imperial theatre to be erected at the corner of Notre Dame avenue and Princess street at a cost of \$150,000 and construction will start this spring at the earliest possible date. It is expected that the contracts will be let about the middle of March.

CONTRACTS AWARDED.

Berlin, Ont.

F. C. Whatmough, electrical contractor, Stratford, Ont., has been awarded the contract for a complete electrical equipment at St. Jerome's College.

Guelph, Ont.

The contract for the lighting and wiring of the City Hall has been let to Stevenson & Malcolm. H. Occomore & Company were the successful tenderers for the metal ceilings.

Oshawa, Ont.

The wiring contract for the Carnegie Library has been let to Alexander Miller, of this city.

Peterborough, Ont.

The Randolph McDonald Company, of Toronto, have been awarded the awarded the contract for the alterations to Jamieson's store, Yonge and Queen streets, to Emery & Ross, of this city.

The contract for the interior decorations and the painting and glazing of the new Royal Bank, King street, has been awarded to the Thornton-Smith Company of this city.

Toronto, Ont.

Simpson & Young, architects, have contracted for the construction of the Rosedale section of the Trent Canal.

Wingham, Ont.

A. Hill & Company, of Mitchell, Ont., have received the contract for the steel bridge at this place at \$7,000.

Winnipeg, Man.

The C. S. Hill Company, sub-contractors for bridge work on the G. T. P., have secured the contract for bridges at Cross Lake and Green Lake.

Foley & Larson, of this city, have secured the contract for the construction of one hundred and twenty-six miles of line east of Edmonton for the G. T. P.

The Board of Control have awarded the contract for the supply of 1,634 tons of cast-iron water pipe to the Canada Iron & Foundry Company, Fort William, Ont., at \$66,924; for supply of 70 tons of specials, same firm, \$4,060; for supply of 6-inch and 8-inch hydrants, Canadian Fairbanks Company, \$8,437.

FIRES.

Building of William Parish, Athens, Ont.; loss \$4,000.

Tobacco warehouse of D. Wigle, Kingsville, Ont.; loss \$7,000.

Clifford House, Dresden, Ont., owned by Allan McIntosh; loss \$8,500.

R. Scaff's planing mill and machinery, Port Credit, Ont.; loss \$3,000.

Storehouse of Canada Plate Glass Company, Toronto, Ont.; loss \$8,000.

Buildings of National Tool & Axe Works, Three Rivers, Que.; loss \$5,000.

Buildings of Harper & Company, J. Wayne and others, Montreal, Que.; total loss \$30,000.

Building of J. A. Coombe, S. J. Jewell, Davies' Meat Company and others; total loss \$15,000.

Buildings and machinery of the Masson Boot & Shoe Manufacturing Company, Masson, Que., total loss \$40,000; factory owned by J. B. Semez & Company.

BUSINESS NOTES.

J. J. Libbey, lumber dealer, of Fort Saskatchewan, Alta., is reported to have assigned to S. H. Smith.

Holmberg & Company, lumber manufacturers, Winnipeg, Man., are reported to have assigned to Matson & Ackland.

Wood, Gundy & Company, Toronto, have purchased \$50,000 Portage la Prairie waterworks and \$12,230 local improvement debentures.

The Dominion Securities Company, Limited, have purchased \$39,281 debentures of the town of Welland, Ont., at 95, which is considered a good figure.

The town of Owen Sound, Ont., have sold to the Dominion Securities Corporation, Limited, \$40,000 4 1-2 per cent twenty year debentures, and \$29,500 four per cent twenty year debentures.

G. A. Stinson & Company, of Toronto, recently purchased a block of \$5,000 bonds of the Manor School district, Manor, Sask., bearing 7 per cent interest and maturing in 20 annual instalments.

A costly error was made recently at Regina, Sask. Only fifteen days were allowed between the dates of the first publication of certain bylaws and the voting thereon, and in consequence the sale of \$555,000 of city debentures to Aemilius Jarvis & Company is voided. The various money bylaws will now have to be re-advertised and voted on afresh. In addition to a vexatious delay, the mistake will cost the city two or three thousand dollars.

MUNICIPAL VACANCIES.

A vacancy has occurred at Belleville, Ont., for a city engineer and applications are invited by W. H. Panter up to February 20th. Applicants are asked to state their experience of water-works.

The Prince Albert, Sask., Board of Trade will receive applications up to February 25th for the position of Secretary-Treasurer, applicants to state salary required and to furnish references.

PERSONAL.

H. N. Ruttan, City Engineer of Winnipeg, denies having received an offer from the coast and states that he has no intention whatever of resigning his position.

C. Holden, late assistant engineer in the power construction department of Winnipeg has been appointed superintendent of the city power plant and lighting system at Moose Jaw, Sask., vice A. C. Read, resigned.

R. H. Jupp, of Orillia, Ont., has been appointed county engineer of Simcoe at a salary of \$1,000 per annum.

The city council of London, Ont., have confirmed the appointment of A. E. Nutter as building inspector at a salary of \$1,000.

BUILDING NEWS.

It is announced that the Grand Trunk Pacific line will almost certainly be completed as far as Edmonton during the coming summer. Every preparation is being made to rush construction, and an effort will be made to surpass the world's record of railway building established by the company last season.

1908 promises to be a good building year in Vancouver, B. C., where the permits issued during January, the dullest month of the whole season, totalled over \$350,000 and established a record for the month, which it is thought will stand for a number of years.

The assets of H. R. Richey Company, Limited, the plumbing and electrical supply firm of Montreal, will be sold by auction on the 21st inst.

Referring to building conditions in Vancouver, a western despatch says that the city is very desirous of getting more buildings, and the present is an excellent time for owners to build, for they are sure to rent. Inquiries for suitable houses are flooding the real estate offices, and the splendid investment offered by house property has been instrumental in getting many owners of lots to erect houses for renting purposes. North Vancouver offers what is practically a bonus to owners for there is no tax on improvements, and this is unique in British Columbia.

It is understood that the Grand Trunk Pacific and the Provincial Government have settled their differences regarding the title to lands which include Prince Rupert town site, one consideration being the pledge of the company to build the western end of the road as soon as possible. A contract for 100 miles east from Prince Rupert will be awarded within three months.

The C. P. R. will make large expenditures in Vancouver this year in the building of jetties on the harbor front, the laying of 21 miles of heavier steel west of Cascade and between West Robson and the foot of the grade. A large amount of bridge work will be done in the Kootenays.

A pair of the largest boilers ever manufactured in Western Canada were recently installed in the power house at Manitoba Agricultural College, Winnipeg, by the Vulcan Iron Works. With a length totalling sixteen feet eight inches and a diameter of eight feet, these huge boilers furnish 150 horse power. They are built to carry 130 pounds pressure, and have been tested to 200 pounds. The shell is five-eighths of an inch thick, and around a fifty-inch fire box are eighty three-and-one-half inch tubes, each thirteen feet long. The make is known as the Scotch boiler.

Dredging on the St. Lawrence.

Out of the 220 miles of the ship channel of the St. Lawrence River which lie between Montreal at its head and the Traverse near the mouth, there are about 70 miles which were originally in need of improvement in order to give a minimum depth of 30 feet and a width of 450 feet on tangents and from 500 to 750 feet on curves. Of these 70 miles, 56 miles have already been dredged in that portion where the tide is not available, so that with the help of the tide for a short distance a 30 foot depth is now obtained all the way from Montreal to Quebec.

From now on the work will be concentrated toward obtaining a greater width in Lake St. Peter, and the tidal parts of the river, as well as the full depth of 30 feet at low tide. About an equal amount of work is yet to be done above and below Quebec. Up to this date 48,037,670 cubic yards of material has been dredged, and it is estimated that 17,385,000 cubic yds. are yet to be dredged, which will give a total of 65,522,670 cubic yards, a very formidable quantity of material.

The St. Lawrence is different from most rivers in its bank and bottom conformation. Usually a river has at its source steep slopes which tend to erode the banks and to transport coarse and heavy material. As the slope becomes more gradual, this erosion decreases until at the mouth of the river the water carries in suspension a fine sediment which deposits, to the great detriment of navigation. In the St. Lawrence the material from most of the sources of supply is all deposited in the settling basins. From the lakes to the ocean the bottom of the river is usually hard, so that there is not only clear water, but a permanent river bed.

The nature of the material composing the bottom of the river, though in many places very difficult of dredge, is for the same reason of such a character that a dredged cut once made is substantially permanent.

In the ship channel the material to be excavated varies from soft blue clay into which a pole may be planted some 6 to 7 feet by hand, to stiff clay, to hard pan as hard as a macadamized

road, to shale rock and large boulders. In one or two localities coarse sand is found, at which points dredging has to some extent to be repeated. Below Quebec, at the localities where the fresh and salt waters meet, there are the usual sand bars, but these do not seem to be increasing. The movable nature of the material, added to more instability in the shoals below the lack of uniformity of the tides, currents and salt water, results in Quebec. It is therefore expected that the maintenance of the excavated channels there will require some annual re-dredging. The currents of the St. Lawrence are, for a river of such size, not only reasonable and regular, but altogether free from the usual dangers to navigation resulting from freshets. Except for floods during the ice accumulations, the fluctuations in level are gradual and not excessive. The winter season, with its ice and snow, is the one great drawback to the St. Lawrence.

The improvement of the St. Lawrence is one of the great works of the world. It was begun in 1844, the first dredge in 1846 excavated in Lake St. Peter, in one day 1,200 cubic yards. By wonderful improvements in plant in 1888 a dredge would excavate 7,200 cubic yards without trouble, and in 1906, working day and night, 20,000 cubic yards was a frequent day's work.

The following statement gives the dredging plant now owned and operated by the Department of Marine and Fisheries, Canada, in connection with the River St. Lawrence Ship Channel: 6 elevator dredges; 1 hydraulic dredge, with 23 pairs of pontoons for floating pipes and 2 winch scows; 1 suction hopper dredge; 1 ice breaking and sweeping tug; 12 towing tugs; 4 coal barges; 2 stone lifters; 1 sounding scow; 1 coal scow; 6 house boats, and 14 hopper scows. Of the elevator dredges four have hulls of wood, the other two have steel hulls. The buckets are generally cast steel, especially designed for working in rock or other hard material. On the division between Batiscan and Quebec, most of the excavation is in solid shale rock. In consideration of the fairly soft character of the shale

rock, the elevator dredge is by far the most economical and efficient machine known to dredge it. The one hydraulic dredge in use is the well-known "J. Israel Tarte." The St. Lawrence at Lake St. Peter widens out into a shallow water lake, about 9 miles wide and 22 miles long. The material is almost all soft blue clay of the consistency of ordinary table butter. A bank made almost vertical will remain for years. There is practically no filling in, but the wash of the propellers deepens the centre of the channel slightly, and deposits it near the south bank. It was in this material that the dredge "J. Israel Tarte" excavated 1,984,510 cubic yards during the fiscal year ended June 30, 1906, at a cost of \$117,668.03, or an average of 5.92 cents per cubic yard. The average hourly rate of dredging was 1,000 cubic yards.

The dredges are operated 132 hours per week, or steadily from midnight on Sunday until noon on Saturday. Stops are only made for repairs, for shifting from one place to another, bad weather, or to give room for passing vessels. Coal is supplied by barges without stopping the work.

The constant steady work in exceedingly hard material at a depth of from 32 to 42 feet is very hard on machinery. Only the very best designed and well constructed plant can stand it. Traffic must not be interrupted and the work must always be carried on in the more or less swift current. The material is increasing in hardness from year to year, as the work nears Quebec. All the soft material except the remainder of the work in Lake St. Peter, is now completed. A dredge that can remove 6,000 cubic yards per day in soft material, without trouble, is more fatigued by dredging 1,000 cubic yards of hard pan, in which boulders are imbedded.

About 400 men are employed in connection with the dredging operations. These men, all sailors, were born and brought up at Sorel or at some of the parishes bordering on the River St. Lawrence. Most of them have been trained to the service from boyhood. A captain and an engineer are in general charge respectively of the vessel and machinery. The re-

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mainder of the crew is divided into two watches and works in shifts of 6 hours. At noon on Saturday the work stops. Only two holidays, Dominion Day and Labor Day, are given throughout the season. The boarding of the men is done by contract with the captain of the vessel, at so much per man.

Prevention of Smoke in Cities.

United States government experts, who have been studying the smoke evil of American municipalities have just issued a bulletin showing how the pollution of the atmosphere can be avoided and how certain cities are earnestly endeavoring to solve this problem. The general statement is made that coal can be burned smokelessly, as are gas, gasoline, or kerosene oil, if the furnaces are properly designed and adjusted. Each of these fuels, it is known, will smoke if conditions are not favorable.

Many steam power plants in the large cities are burning bituminous coal practically without smoke, and

if this can be done in certain plants, it may ultimately be done in all. The purpose of authorizing these investigations, which were carried on by the United States Geological Survey, is to increase the efficiency and thus to prevent the waste of fuels, especially such as are used by the United States Government. Mr. D. T. Randall, engineer in charge of smoke abatement investigations and author of the bulletin, declares that it is a recognized fact that the more nearly perfect the combustion of any fuel the greater the efficiency. With perfect combustion there is no smoke.

"With the knowledge that it can be prevented, there has come an increasing demand from the people of the large cities that smoke shall not be allowed to pollute the atmosphere," says Mr. Randall. "In nearly all cities of the United States efforts are being made to abate the smoke. As a result of the demands of the public the ordinances of some of these cities require that all new plants be equipped properly and that old ones be remod-

eled, and permits are now necessary for the installation of all boilers and furnaces.

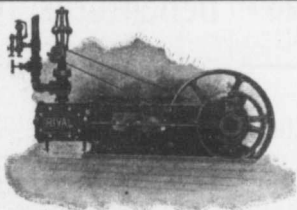
"At present no city in which a considerable quantity of bituminous coal is burned is free from smoke. The cities of the East have avoided this problem by a general use of anthracite coal. For this reason it is not surprising that the greatest improvement in the methods of burning bituminous coal has been made in the Central and Western States.

SMOKELESS FURNACE REQUIREMENTS.

"All of the authorities on the subject of combustion and smoke prevention agree upon the following conditions as requirements for a smokeless furnace:

"The coal should be supplied to the furnace in small quantities at frequent intervals. The more nearly the feed approaches a continuous and uniform supply the better the results.

"The air supply should be slightly in excess of the theoretical amount required and be admitted principally through the fuel bed, with an auxil-



RIVAL ENGINES

Medium Price Medium Speed Medium Size Write for Circular
Laurie Engine and Machine Co., Limited
MONTREAL, CANADA

"Esco" Steel Coating, a Preservative for Metals and Wood

"Esco" Steel Coating is put up in the form of paint and is furnished in three colors, black, red, or green. "Esco" Steel Coating will not peel off, crack or blister; it absolutely prevents rust or corrosion; it is gas-proof, acid-proof and weather-proof; it is the greatest wood preservative known.

ALSO
"Esco" Waterproofing for protecting concrete, cement, brick, stone, etc., against dampness.

Local Agents Wanted. For circulars and other particulars, apply to

EADIE-DOUGLAS CO., Montreal



CONTRACTORS FOR
**STEEL HIGHWAY
BRIDGES,
CONCRETE ABUT-
MENTS,
REINFORCED CON-
CRETE FLOORS,
ETC.**

ONTARIO BRIDGE COMPANY

34 VICTORIA STREET, TORONTO, ONT.



Well Drilling Contractors

Equipped with the most modern machinery for drilling **Water, Oil, Gas or Salt Wells**, to 50 or 5,000 feet in depth, any diameter from 4 to 12 inches.

Tests made for foundations, such as—**Building Bridges, Trestle Work, Canals, etc.**

WALLACE BELL

275 Laval Ave., MONTREAL, CAN
References from the largest Manufacturing Companies, and Financial Institutions in Canada.

TENDERS AND FOR SALE DEPARTMENT



Department of Railways and Canals, Canada

TRENT CANAL.

ONTARIO-RICE LAKE DIVISION.
SECTION No. 3.

NOTICE TO CONTRACTORS.

Sealed tenders addressed to the undersigned and endorsed "Tenders for Trent Canal," will be received until 10 o'clock on Thursday, 12th March, 1908, for the works connected with the construction of Section No. 3, Ontario Rice Lake Division of the Canal.

Plans, specifications and the form of the contract to be entered into, can be seen on and after the 5th February, 1908, at the office of the Chief Engineer of the Department of Railways and Canals, Ottawa, at the office of the Superintendent Engineer, Trent Canal, Peterboro, Ont., and at the office of Mr. J. B. Brophy, Division Engineer, Trenton, Ont., at which places forms of tender may be obtained.

Parties tendering will be required to accept the fair wages Schedule prepared or to be prepared by the Department of Labour, which Schedule will form part of the contract.

Contractors are requested to bear in mind that tenders will not be considered, unless made strictly in accordance with the printed forms, and in the case of firms, unless there are attached the actual signatures, the nature of the occupation, and place of residence of each member of the firm.

An accepted bank cheque for the sum of \$10,000 must accompany each tender, which sum will be forfeited, if the party tendering declines entering into contract for the work, at the rates stated in the offer submitted.

The cheque thus sent in will be returned to the respective contractors whose tenders are not accepted.

The advertisement dated the 16th January, 1908, is hereby cancelled.

The lowest or any tender not necessarily accepted.

By order,
L. K. JONES,
Secretary.

Department of Railways and Canals,
Ottawa, February 3rd, 1908.

Newspapers inserting this advertisement without authority from the Department will not be paid for it.

inary supply admitted at the front or rear of the furnace to burn gases from the coal.

"The temperature in the furnace should be sufficiently high to ignite the gases given off from the fuel bed.

"There should be a fire-brick combustion chamber of sufficient dimensions and so designed as to cause the thorough mixture of the gases and the air, permitting complete combustion before the mixture reaches the boiler surfaces.

"The efficiency of the furnace and the degree of success attained by any equipment in the prevention of smoke depend on the skill of the fireman, proper design of the furnace, and

TENDERS FOR CITY SUPPLIES

Sealed tenders, endorsed "Tenders for Cement, or etc.," will be received by H. E. Gillis, City Clerk, Calgary, Alta., until March 1st, 1908, for the following materials:—

Cement
Pig Lead
Lead pipe
Cast iron water pipe
Corporation Cocks
Sewer pipe

Specifications may be obtained from the City Engineer. The lowest or any tender not necessarily accepted.

R. E. SPEAKMAN,
City Engineer.

Calgary, Alberta, Jan. 25th, 1908.

Notice to Contractors

I have a patented construction process far ahead of any so far used. I require Contractor to work it up. The strongest and lightest buildings can be made. For particulars address, P. O. Box 1144, Montreal.

DEBENTURES FOR SALE

Tenders will be received by the undersigned up to SATURDAY, THE FIFTEENTH DAY OF FEBRUARY, A. D., 1908, for the purchase of Twelve Thousand Dollars (\$12,000) worth of debentures of the said Town of Aylmer bearing interest at the rate of six per cent. per annum running for a period of twenty years. Interest and Principal payable in equal yearly sums of \$1,046.22.

JUNIS BRADLEY,
Town Clerk,
Aylmer, Ontario, 8

Tenders for Furnace for Bolton School

Sealed tenders will be received by the undersigned up to TUESDAY, APRIL 7th, 1908, for installing a furnace for heating and ventilating in Bolton Public Sch o'—four rooms. Furnace to be suitable to the requirements of the building and to be placed in position during the summer vacation, 1908.

Lowest or any tender not necessarily accepted.
JNO. MACDONALD,
Secretary of Board.

Bolton, Ont.

Secretary of Board. 10

boiler setting, character of the coal, capacity of the boiler and furnaces, and the load carried.

"Very few firemen can be induced to fire regularly and frequently because it is easier to put in enough coal to last twenty or thirty minutes at one time and have little or nothing to do in the interval between firings.

"The hand firing of plain furnaces violates all the principles laid down for securing good combustion. The coal is usually supplied in large quantities at long intervals, and the result is that at the time of firing the temperature of the furnace is lowered, the resistance to the flow of air

NOTICE TO CONTRACTORS

Tenders from all trades will be received by the undersigned until February 26th, 1908, for a Hospital building to be erected in Welland, Ont. Plans and specifications may be seen at the office of the Architects, or at the Town Hall, Welland, on and after February 15th.

LANGLEY & HOWLAND, Architects,
Continental Life Bldg.,
Toronto, Ont. 8

Town of Collingwood

Tenders are invited for the purchase of the following debentures of the Town of Collingwood:

\$8,600 Consolidated Debenture Act, 1899, 30 years, 4½ per cent.

\$7,700 Consolidated Debenture Act, 1889, 30 years, 4½ per cent.

\$6,000 Local Improvements, 20 years, 4½ per cent.

\$3,800 Water Works, 20 years, 5 per cent.

\$12,000 Good Roads, 20 years, 4½ per cent.

The above debentures are guaranteed by the County of Simcoe.

Tenders to be given for each separate parcel. Successful tenderer to pay at par in Collingwood and the cost of forwarding debentures.

Tenders, marked "Tenders for Debentures," will be received by the undersigned up to noon, FEBRUARY 27th, 1908.

The highest or any tender not necessarily accepted. For copies of by-laws and further information apply to J. H. Duncan, Town Clerk.

J. R. ARTHUR,
Chairman Finance Committee. 9

Debentures for Sale

Tenders will be received by the undersigned up to 7 o'clock P. M. of the 27th DAY OF FEBRUARY, 1908, for the purchase of the following Debentures of the Town of Waterloo:

1. Local Improvement Sewer Debentures, 30 instalments, \$8,522.54.

2. Local Improvement Cement Walk Debentures, 20 instalments, \$4,357.31.

3. General Sewer Debentures, 30 instalments, \$10,000.00.

4. Gas Plant Debentures, 30 instalments, \$10,000.00.

5. School Debentures, 20 instalments, \$3,900.00.

All of the above Debentures bear interest at 5½ per cent. Tenders are required for three parcels—1st, Nos. 1 and 2; and, Nos. 3 and 4; and 3rd, No. 5. Dated at Waterloo this 17th day of February, 1908.

A. B. McBRIDE,
Clerk. 8

through the fuel bed is increased, and consequently great quantities of combustible gas which can not be burned for lack of air and the necessary amount of heat are generated. Hand-fired furnaces with ample combustion chambers and adjustable openings for air admission are suitable for some kinds of coal if tended by careful and experienced firemen."

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A mixture of one part powdered brick, one part lime, two parts sand, makes a good mortar for tanks, cisterns, drains, etc., better, it is said, than natural cement.

Reinforced Concrete from the Contractor's Standpoint.

(Continued from Page 15.)

A circular saw will effect economy in a building of moderate size, especially if the same engine or motor may be used to run the saw and other machines, such as a boring machine, a steel hoist, a grindstone, or a shear.

In warm weather, with a complete set of forms for one storey, a speed of construction of one storey in eight or nine working days may be attained. With one complete set of column forms and a set and a half of floor forms, a speed of a storey a week may be attained. The size of the building in plan makes very little difference.

In the discussion of methods of handling steel, the first question is, to what extent shall machinery be used in bending bars? At the present day there is, so far as I know, no machine which bends tension bars

for beams and girders as economically as they can be bent by hand. For one thing, the cost of handling the bars to and from the place of bending is a very large percentage of the cost of bending, and this cost would remain the same in either case. The decisive reason is, however, that the variety of possible shape of bend bars is infinite; the number of different shapes required in one building is very large, and a machine, to be efficient, would have to be capable of rapid adjustment from one shape to another, and consequently complicated.

A machine can be made to bend stirrups and hangers economically, as they are light and of smaller variety than tension bars.

In making spirals two processes are involved: First, bending the steel, which is usually in the form of wire, to the required diameter; second, spacing the coils to the required pitch,

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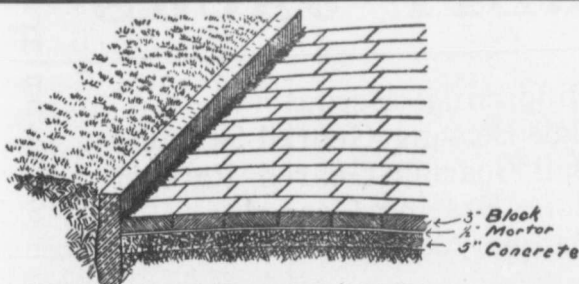
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WINDSOR, ONT

and fastening them so rigidly to longitudinal bars that this pitch will not be disturbed in handling. The first process is accomplished more economically by machine, the second usually by hand.

A simple cast iron block may be used for bending beam and girder bars. The block is attached rigidly in a horizontal position to a bench, the bar is dropped in a slot in the block, a piece of extra heavy pipe is slipped over the end of the bar, and two or three men bend it to the required angle. This bending block may be made of an iron plate with two angles riveted to it back to back to

form the slot. Stirrups when bent by hand are bent on such a plate, the angle, of course, being small and only far enough apart to admit a bar of the size used for stirrups. A plate for bending stirrups may be made small enough to slip in the pocket.

Spirals are made up on a simple wooden reel, the requisite of this reel being that it should be rigid, adjustable for different diameter, and collapsible to allow the finished spiral to be easily slipped off.

The question whether power other than hand power should be used to hoist the reinforcement to the floor where it is to be used depends upon

the height of the building, the quantum of the fall-rope on the derrick pulls the column to which it is attached out of plumb less than an inch, and this displacement is easily recovered with a guy rope and turnbuckle before concreting.

The question whether or not a charging hopper shall be used depends on several things. Unless it is possible to set the mixer several feet lower than the storage of sand and stone, some kind of hoist must be arranged to fill the hopper. This means additional machinery and generally the wages of an additional engineer. In New York City one of the ob-



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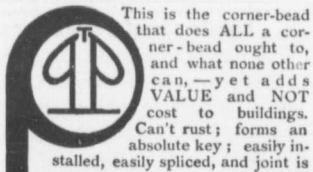
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stacles to setting a mixer much lower than the storage piles is tidewater. Basement floors in New York are often laid as near tide level as possible; during the construction of a building the basement is used for storage of sand and stone and in order to set the mixer much lower than the basement floor an expensive waterproof pit must be constructed. A charging hopper, of course, makes it possible to charge the mixer more rapidly; but the fact should be borne in mind that no time is saved by charging the mixer more rapidly than the concrete can be taken away, up on the floor. The mixer should be set so low that the wheelbarrows run on a level or slightly down grade in feeding the mixer.

In many cases the mixer is driven from the shaft of the hoist, and this shaft, from the motor.



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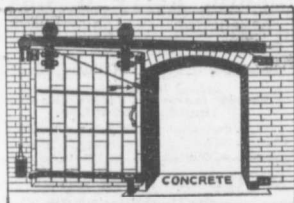
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Public Comfort Stations.

A matter to which little public attention is given as a general rule has been brought to notice prominently of late by an article which appeared in the Chicago "Daily News." The question of public lavatories for our cities is one which has little to commend it as a topic of public discussion, and for that reason the tendency is to ignore the subject until its discussion is practically forced upon us. In the present instance the article in "The News" has succeeded in arousing considerable interest in the public mind.

"An imperative public necessity," says the writer, "is now left to be provided for at private expense. The numerous large office buildings are obliged not only to furnish toilet facilities for their thousands of occupants, but to accommodate a public patronage so large as to inconvenience their own tenants and increase the cost of their elevator and janitor service. Some of their elevator starters say that if they could keep the public from using their toilet rooms they would be able to reduce their elevator service one-third."

"The railroad station toilets have an enormous patronage and are used at certain hours far more by the general public than by railroad passengers. Hotels and restaurants make generous provision for far more people than their patrons. But in self-defence some of them keep bouncers, forcibly to eject such persons as are deemed undesirable among the multitudes who seek their accommodations. An elevator starter says that he "allows any man to use the toilet facilities in his building if he is respectable looking, but if he is dirty and looks like a tramp he sends him to the saloon across the street."

"The saloons are left to furnish the only facilities open to the great majority of men and women all over town. To leave the saloons to meet a natural necessity forces the drink habit upon people, imperils the moral welfare of the community and improbably intrenches the liquor traffic. The attempt to close the saloons on Sunday in New York City raised the natural outcry against shutting

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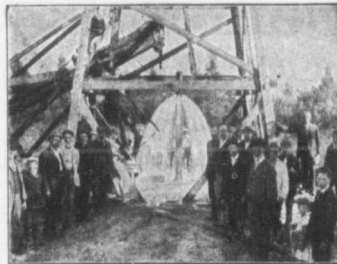
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the people out of the only toilet accommodations open to them. A Chicago pastor, the men's club of whose mission is among the organizations trying to secure public comfort stations, says that a member of the club who was formerly a teamster pleaded that other men should be relieved of the temptation to drink to which he was exposed by being forced to frequent saloons by his necessity to use their toilets.

"Frederick L. Ford, City Engineer of Hartford, Conn., reported to the City Club that New York has thirteen toilet stations, costing \$25,000 each, built on ground owned by the

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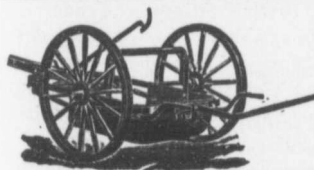
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city, maintained at \$4,000 to \$6,000 expense a year, open at all necessary hours, with both male and female attendants. Boston has a \$16,000 station, providing hot and cold water, with soap and towel, for 1 cent each. Cleveland combines a trolley waiting room and public comfort station, built by the Park Department at \$10,000 cost, which registered the visits of 1,485,620 men and 306,780 women in a single year. Smaller cities—Columbus, Denver, Hartford, Indianapolis, Louisville—are already provided with such conveniences or are about to put them in. Abroad the provision is universal in both little and big cities, poor and rich towns. Paris is best equipped. Berlin and other German cities are well provided. Even impoverished Italian towns at least meet the wants of nature. Rio Janeiro has thirty public lavatories in fifteen small market places. London gathers enough receipts from paying patrons to meet the working expenses of the free toilets."

It is surely time that more attention was paid this matter. The laboring classes stand to suffer most by the lack of proper accommodation, and for that reason it may be that so little complaint has been heard in the past.

British Shipping Trade.

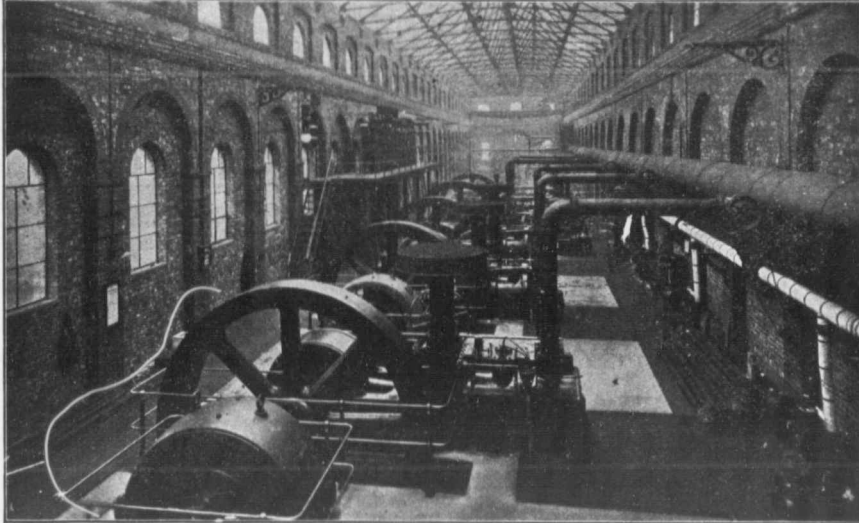
The statistics of the world's shipbuilding in 1907, just issued by Lloyd's register, show a total output of mercantile tonnage by the United Kingdom of 1,742,365, being a decrease of 220,000 tons as compared with 1906, which was the highest on record. The foreign output in 1907 increased by nearly 80,000 tons.

Great Britain, however, still builds more than one-half the mercantile shipping of the globe, which last year showed a net increase of 1,984,800 tons, as compared with an increase of 2,158,000 in 1906.

The world's fleet of sailing ships was reduced during the year by 180,000 tons, and the steam tonnage was increased by 2,164,800.

Great Britain is still a large purchaser of vessels built abroad.

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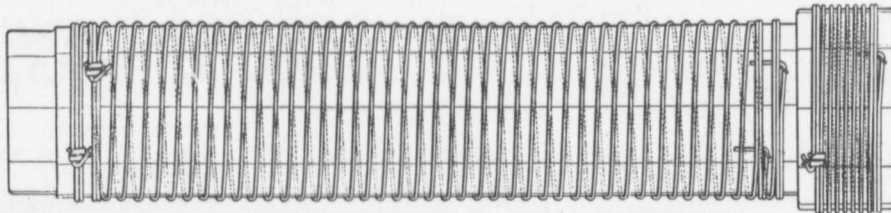
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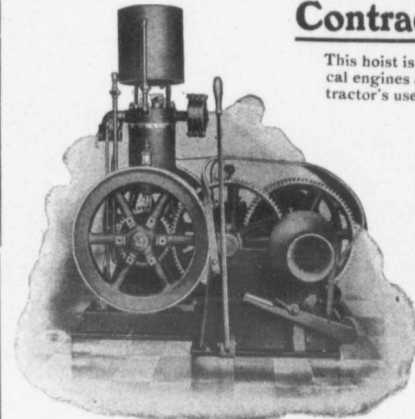
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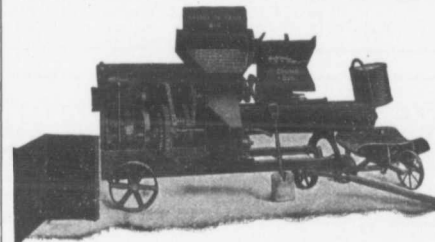
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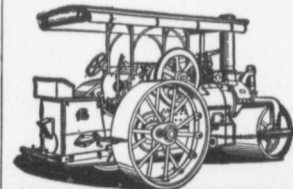
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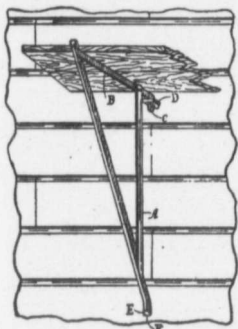
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