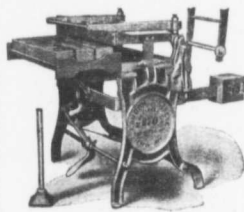


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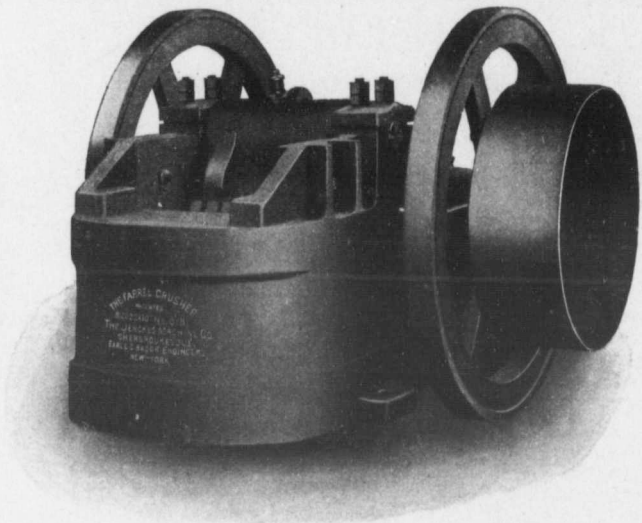
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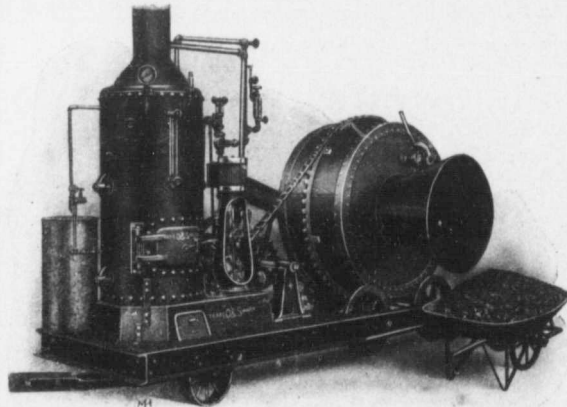
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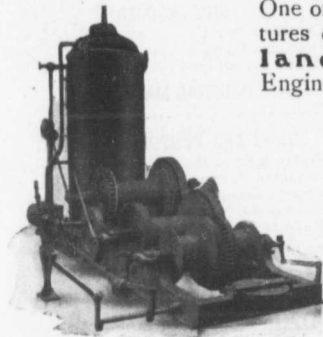
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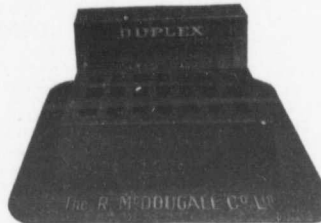
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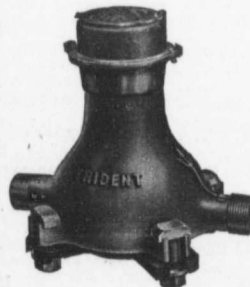
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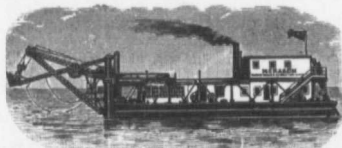
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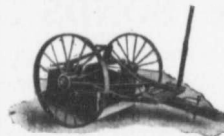


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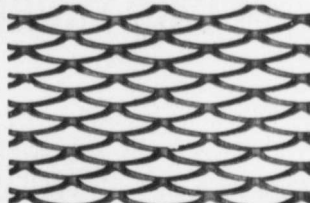
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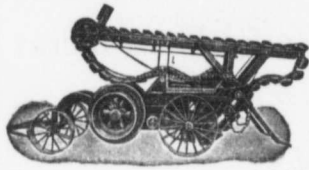
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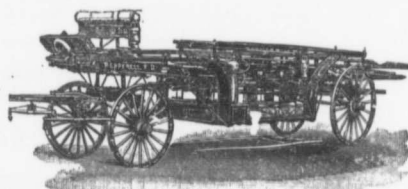


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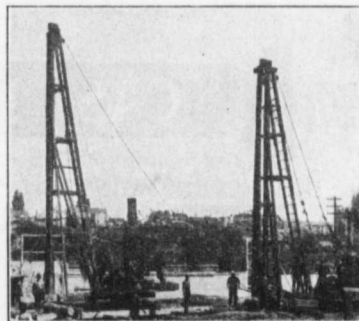
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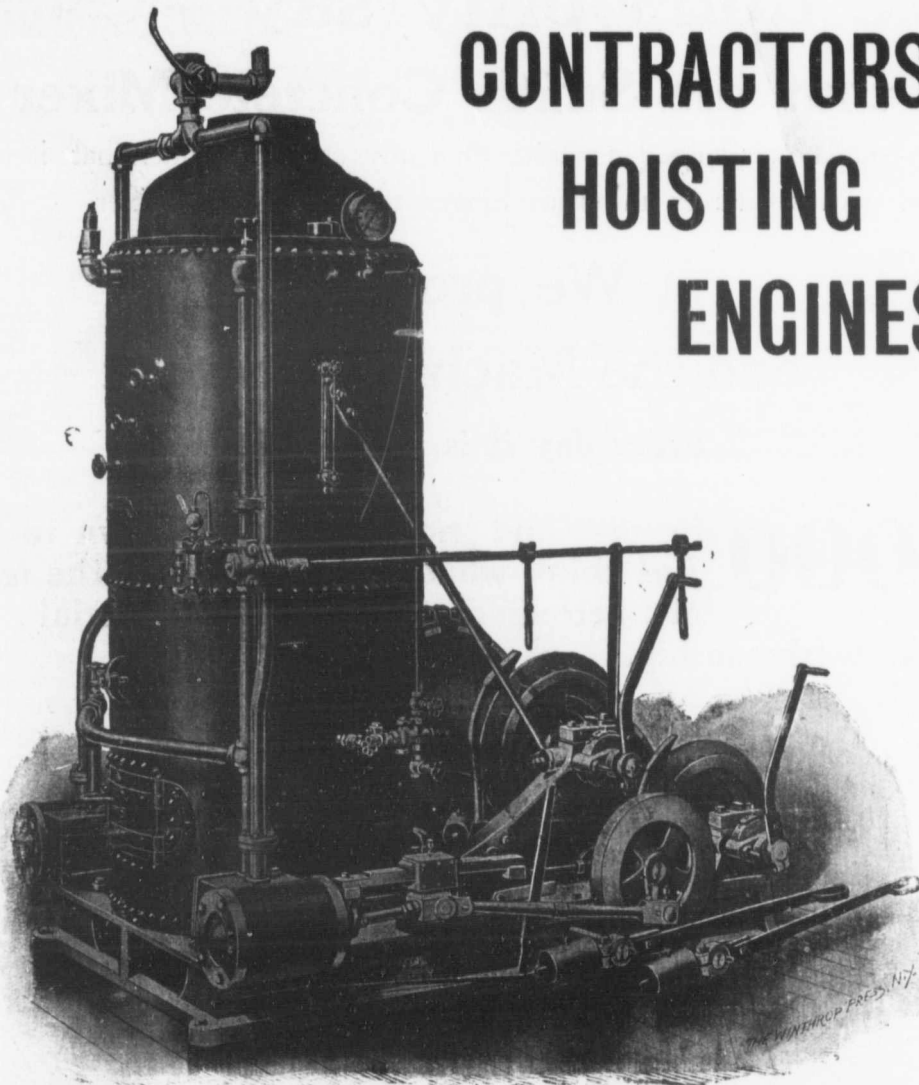
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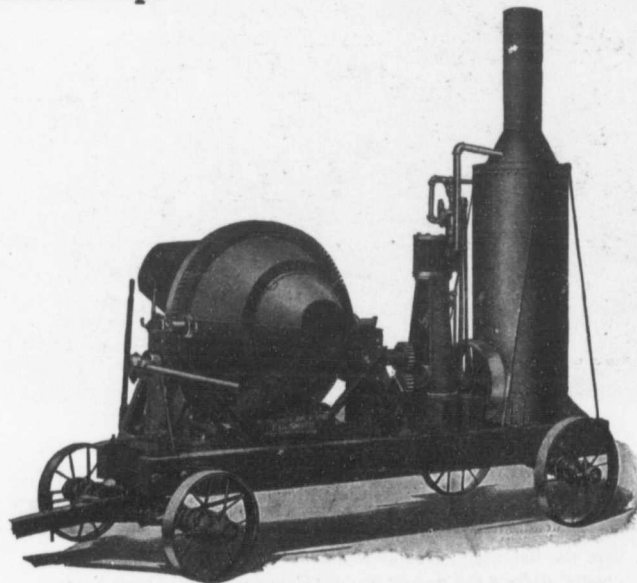
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We prove it
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Spring Building.

As was to have been expected, the season's building is developing gradually, but nevertheless, with an aggregate volume which was hardly to have been anticipated except by those having a close observation of the general situation. The heaviest run of building now is in residence work, and the number of cottages and medium priced dwellings which are going up afford a good indication that people generally are not withholding from themselves the comforts of new and modern dwellings. Much of this work is evidently being done for personal occupation, but there is also a considerable amount of work being done by syndicates for tenant use. The rapid progress being made in such buildings gives good evidence of the fact that all conditions are favorable for building promptly and well and satisfactorily at this time. The delays which attend work in a congested period are largely of short duration if at all, while the character of the work done is somewhat better, owing to there being less distraction to workmen or builders from too many other opportunities for similar employment. The tendency to build at this time is a wise one, for conditions seem unlikely to be more favorable for both owner and contractor than they now are. The way the season is developing gives every reason to anticipate a fairly good aggregate of work, and from this time forth,

barring untoward experiences, work will be more plentiful and the tendency will be toward more delay as well as toward a reaction in prices generally.

Our Public Schools.

The public and their representatives on the public school boards have entered upon a strenuous campaign of inspection and criticism of existing fire escape facilities in the public schools of the country. Fire drills are frequent. Doors long nailed securely in their frames are now squealing in distress upon rusted hinges and trustees and teachers alike are wracking their brains for methods of precipitating into the stree's with the minimum loss of life the children in their charge. "Doors that opened inward," "architectural errors," "combustible construction," are a few of the suggested explanations for the loss of one hundred and seventy children in the fire that on March 4 destroyed the Lake View School in North Collinwood, Ohio.

Thoroughly fireproof construction for school buildings and fire escapes outside the walls are being generally demanded. Fire drills are good, but of what use is a fire drill when children feel the fire behind them and find the way of escape cut off in front. The Cleveland calamity shows that all new school houses must be fireproof. A fireproof schoolhouse need cost little or no more than a combustible one, while it is stronger, will last longer and would make impossible the awful sacrifice of life reported in Cleveland. Unfortunately the construction of fireproof school buildings is a new rule. Buildings now in use are with very few exceptions not fireproof and some of them have been condemned as highly dangerous. To tear down these unsafe structures, wherever they are particularly dangerous, and to replace them with fireproof buildings appears to be the only proper method if the lives of our children are to be preserved.

Sixty-three dwelling permits were issued by the Toronto City Architect for the first nine days of March. The total permits amounted to \$171,500.

Cement Blocks.

The lower prices and freer distribution which are now prevailing in the case of Portland cement should have a good effect upon the concrete block business. There was during the past season more or less difficulty at times in securing deliveries of cement, and the prices being materially higher, served to hold back work in which this material might have been used. Now that both are more favorable, there should be a bigger demand for the blocks. In fact, already it is to be noted that the blocks are in considerable demand for residence foundation work, where their ease of handling and rapid working make them a favorite. The lower prices prevailing give concrete block makers the opportunity to push their goods to the public in a way that should not be overlooked. Concrete block makers are not showing the ability to grasp the situation and make the most of it that they should, so far. They have a good product and the general public is getting to realize it. But the lower prices now ruling should be made the subject of considerable liberal advertising. Comparative statements should be made as to the probable cost of popular sized structures, using stone and using concrete blocks. In fact an era of publicity should be indulged in by block manufacturers. There was a time when the general press was inclined to give exceptional publicity to the blocks, and spread a great deal of information, some of it erroneous and some of it good. But the novelty having worn off, the blockmaker must see to his own publicity, and the present time affords an excellent opportunity for starting.

Object to Alien Building Material.

The Canadian Manufacturers' Association have forwarded a protest to the Dominion Government against American cement and steel being used in the three-quarters of a mile of building inland from the Canadian portal of the Michigan Central Railway tunnel under the Detroit River to Windsor.

Fireproof Schools.

Catastrophes such as those at Collinwood, Ohio, and Boyertown, Pa., are possible in nearly every city and village in the country. According to Richard L. Humphrey, engineer in charge of the structural materials laboratories of the U. S. Government. He declares it providential that more of these holocausts have not occurred. Mr. Humphrey, in his Official capacity, in charge of the structural investigations being conducted by the Technologic branch of the United States Geological Survey, has made a thorough study of fireproofing and is therefore well qualified to speak on this subject.

"The shocking catastrophe at Collinwood, Ohio, last Wednesday which sent thrills of horror into every home in the country, did not result from exceptional conditions, but conditions that are to be found in thousands of instances throughout the United States. The same or even worse fire traps prevail in every village and town, and indeed in many of the large cities. Even where municipal laws are supposed to govern the erection of such structures, the conditions are often worse than in Collinwood. Such calamities as we have had the few months of this year do not come as a matter of surprise to anyone versed in the subject. The only surprise is that these catastrophes do not occur more frequently.

"The newspapers are now filled with statements made by school officials, calling attention to the necessity of fire drills — that these fire drills will prevent the loss of life from fire. Necessary and excellent as they are in their place, nothing could be more fallacious than such a general proposition. What is needed, as has been repeatedly pointed out, is the erection of structures which have the greatest resistance to fire. From what I can learn, the fire drill at Collinwood had started but the school building was such a flimsy tinder box that the fire traveled through the hallways and up the stairs faster than any possible fire drill. In such a building, and there are many of them, the fire will always win the race over the frantic children. Had the in-

terior of the Collinwood school been reasonably fireproof, the loss of life would have been very much less and possibly no lives would have been lost.

"Laws should be enacted to prohibit the erection of anything except a structure of the highest fire-resisting type, especially when it is to be used as a school, hospital, theatre, or other structure in which people assemble in large numbers, who in the event of a fire, such as happened at Collinwood, would be to a certain extent helpless. In our hospitals and public schools, it would appear unwise to erect structures of more than two storeys in height. In such buildings, in addition to wide stairways, I would have the one or two chutes or tubes leading from the top storey to the ground. These would prove not only much safer than fire escapes, but also a much more rapid means of exit.

"The question of the height of buildings and the character of the interior structures is continually agitating public officials, but commercial interests seem to dominate, and buildings are erected that are known not to be the most safe for the purpose. This condition pertains as much to municipal structures as to any other class of buildings. It is a fact that the money available for schools, hospitals and other municipal structures is usually inadequate for the purpose, and the officials in charge, in order to keep within the appropriation, are forced to erect cheap, flimsy buildings that are not fireproof.

"While the relative fire-resisting qualities of fireproof materials is not yet entirely established, it is a fact that these properties are sufficiently well known to permit the erection of reasonably fireproof structures. Yet in the face of all this, buildings are continually being erected with materials known not to possess an adequate resistance to fire, and these buildings are a menace to the cities in which they are erected.

"The remedy for these conditions is not in elaborate systems for fighting fire, or any elaborate fire drills, which may or may not be effectively carried out, but in the enactment of

strict municipal laws compelling the erection of structures entirely fireproofed with materials of the highest quality, and especially in the prevention of the erection of flimsy structures where women and children gather in large numbers, as for example, schools, theatres, hospitals and similar buildings. Unless such action is taken, greater calamities than those at Collinwood and Boyertown, attended by even greater loss of life, will undoubtedly occur.

"The continual increase in the height of buildings, for office or mercantile purposes, as for example, in the city of New York, gives rise to many problems. One of the most important is the question of handling through the streets the immense population crowded in a very small district. As this congestion increases through the erection of these great buildings, it will be necessary in the near future to double-deck the streets in order to accommodate this immense population and also to multiply the present transportation facilities.

"Buildings should not be erected so high as to prevent the fire department from fighting a blaze in the upper parts of such structures, unless these buildings are supplied with fire-fighting apparatus of their own, capable of taking care of any fire beyond the reach of the firemen. At present the average fire department is helpless or seriously handicapped in successfully coping with the fire in a building over 150 feet high. This means that the firemen can take care of the first fifteen storeys of a skyscraper. Beyond that, the tall buildings will have to look out for their own safety against fire."

"Statements have appeared in the daily papers throughout the country that the school building at Collinwood and the Parker Building in New York were examples of reinforced concrete construction, and these fires proved the worthlessness of this class of construction. Neither building contains any reinforced concrete. Concrete has been demonstrated to be one of the very best materials for fireproofing purposes, and its increased use will add materially to the public safety."

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The Necessity of Continuity in the Steel Reinforcement of Concrete Structures.*

Concrete structures exhibit the usual phenomena of elastic solids, especially when they are provided with a skeleton of steel, properly proportioned and distributed throughout the concrete mass, according to circumstances. In the construction of concrete sidewalks and of most retaining walls, particularly if of massive design, special effort is made to reduce within certain limits the size of the parts which will act as units. In some arches, efforts have been made looking toward a similar result, but in structures of that class, the present tendency seems to be to treat them frankly as continuous elastic structures, even though their detailed design is thereby rendered quite complicated. In such structures as lines of concrete pipe, separate units are being employed even when of large diameters, but most work is of the continuous or monolithic variety.

No half-way course is possible between these two classes of structures. If an arch is designed without joints, but the reinforcement is not arranged for a continuous structure, joints are almost certain to form in accordance with nature's laws by the cracking of the work, and sometimes they may occur at points which even threaten the stability of the structure. At least, they are often exceedingly unsightly. A concrete sewer is out of sight and usually so arranged that there is little danger of collapse, should a few small cracks occur. But in this case another danger may exist. In a small city in a middle western state, a sewer was found to have become clogged so that it burst and flooded the cellars of the adjoining property. Investigation showed that a root from a willow tree had entered the sewer through what must at first have been a very small crack, and had multiplied its fibres within the sewer to such an extent as to cause the trouble above mentioned. The matter of building design will be more fully discussed a little later.

From even the two cases above cit-

ed, it would seem all important, when a concrete structure is to be constructed monolithic in character, so to distribute its reinforcement as to make it act like a continuous solid, and in its design treat it as an elastic structure subject to stresses and strains from its own weight, from the live load and its impact and variation in intensity, from changes of temperature, local settlement, etc. What follows will be almost entirely a discussion of the subject of continuity, as found in the structural members of buildings, it being taken for granted from this point onward that continuous structures should be erected with reinforcement designed to provide such elastic resistance as the continuous nature of the member demands.

A few concrete buildings have been erected in which the several structural members have been moulded on the ground and erected and set in place in the same manner in which timber and steel work is handled. In the majority of cases, however, it has been the endeavor to secure a monolithic structure, and this theoretically monolithic nature has been one of the points much advertised as a great advantage inhering in concrete work. This very condition of perfect continuity has some minor disadvantages. Sound and vibration are transmitted much better than in a less rigid structure, but the greater mass and the inherent nature of the propagating medium tend to absorb the vibrations so that at least one of these disadvantages is usually turned to a favorable property. A much more important point for consideration in this connection is the fact that in structures composed of separate members, innumerable joints naturally exist at which expansion and slight changes of position from deformation can take place without endangering the structure, because brackets and other devices are provided to allow such conditions. The first designers in reinforced concrete were so imbued with the ideas of the older types of structures that they thought of the several members of a concrete building as

practically identical with those of all other types.

The first regulations covering reinforced concrete work adopted by municipalities thus viewed this point, as is shown by their specifying that a factor of one-eighth should be used in the design of beams, girders and slabs. Very soon, however, trouble arose in buildings executed in accordance with such designs, which were being loaded to anything approaching their theoretically safe carrying capacity. Cracks occurred in the floor surface at the ends of the beams and girders, and slabs cracked away from beams in the same manner. These cracks were often ascribed to shrinkage or settlement or some other factor, but in many cases were the necessary result of natural deformations of the structure. They showed that the same thing took place in concrete beams as happened in any other kind, but that allowance had not been made for such action. The next step was to require special reinforcements over points of support, to correct this trouble; and in order to secure some hypothesis for determining the amount to be used, advantage was taken of an observed fact that the factor 1-8 could be reduced to 1-10 for various reasons for moments at the centres of beams. Since 1-40 measures the difference between this factor and the theoretical total, the amount of reinforcement thus determined was specified at the points in question.

When thus reinforced, a continuous beam possesses partial restraint at the ends. If a homogenous beam of constant section be considered, and one with a moment of inertia correspondingly less than a beam designed to carry the same total load when supported without restraint, it will be found that the theoretical slope of the neutral axis at either support is to be measured by the numeral 7, as compared with 10 for a free beam. Such a slope would theoretically open a considerable crack at the top of almost any beam. Obviously if this condition existed, the steel designed to carry a moment measured only by the factor 1-40 and at a stress equal to that of the steel near the bottom of the centre, would actually be stretch-

*A paper read before the National Cement Users' Association by Mr. E. P. Goodrich, Consulting Engineer, New York.

ed much more than such a stress would deform it. Consequently it would be carrying more than is above considered, with a correspondingly smaller slope of the beam. In a reinforced concrete girder, however, the moment of inertia is not constant throughout, and consequently the slope would probably be fully as great as first described above, even though the reinforcement was stressed beyond the permissible amount. If this actual stress happened to exceed the elastic limit of the top reinforcement, as may easily happen, a permanent deflection would result in the top of the beam. Furthermore, a similar permanent set would have taken place in the concrete on the under side, below the crack, because of the high compression which would have taken place in the concrete. A repetition of the load would be likely to increase the first increments of deformation, and this increase would continue until a slope had been permanently secured, beyond which the added deflections caused by ordinary loading would not cause stresses above the new elastic limits of either the steel or the concrete.

But in order to attain this state of affairs, the stress conditions in the beam may have far exceeded safe limits, and many observations have shown this to have actually happened in more than one building.

The dangers incident to such tension cracks adjacent to points of support are numerous. They occur where the shear in the beam is a maximum and unless ample reinforcement is introduced to resist these latter stresses (as is really very rarely done), their unit values will run up far beyond limits usually considered safe. These initial tension cracks also serve as starters for others which tend to occur from the diagonal principal tensile stresses. Cracks of the latter variety are apt to develop suddenly, producing destructive failure in test specimens, and there is no reason to suppose that more immunity would be found to inhere in actual structures, should the load ever reach a critical value. With the formation of such cracks, the zone of compression is obviously restricted to the uncracked

part of the concrete, and if the crack is driven across the initial position of the neutral axis, the unit stresses in the extreme concrete layer must exceed permissible safe ones. Then, too, in the cracked condition, the concrete can have no tensile value, and while this element is usually ignored in design work, its practical effect is well known to those who have made tests of beams and who have studied the subject of diagonal tension to any great extent. With a cracked condition, moreover, there is almost infinitely more opportunity for the reinforcing steel to be attacked by rust, with possible further incidental troubles. The few laboratory tests concerning this matter which have been made, principally in Germany, are inconclusive, and are best interpreted by the facts of actual experience, wherein rust has been discovered in connection with very fine cracks, when the metal was not covered with more than 3-4 in. of concrete.

The more steel is supplied over points of support (up to the theoretical necessary limit), the more are the above-mentioned destructive tendencies reduced. Of course, with perfect restraint, twice as much reinforcement is required over supports as at the centres of beams. It is needless to state that this condition is almost never attainable at end bearings, although it is often closely approached at intermediate ones in large buildings, especially on the lower floors where heavy column loads give excellent stability to the members meeting at those points. With regard to the latter point, a column 16 in. square and stressed to 300 pounds per square inch, for instance, will resist a moment of 28,800 inch pounds, without developing tension on one side of the base, if it acts only with its vertical load. This will be equivalent to that of a uniform live load of 832 pounds per square foot distributed over a panel 20 feet square. Of course such a column, if of any considerable length, would itself be bent to some extent by such a moment. This example tends to show the real action of the reinforcement usually installed and also indicates the necessity of a better form of splice on longitudinal

rods in columns than a piece of gas pipe slipped over the ends of the rods. On the upper floors, however, and in wall columns, special reinforcement must be installed if any real restraint is to be secured above that afforded by the tensile strength of the concrete itself.

The same general reasoning applies to slender columns which may be flexed by beams supported by them, as has been given for beams with deficient reverse moment reinforcement. This is particularly true with regard to the columns which have been designed to support long-span, heavy roof girders. There is no reason why such a combination cannot be analyzed, even as to the effect of unequal settlement, and the writer invariably makes an analysis of such designs, on the assumptions of rigid restraint at foundations, no shortening of the girder through its deflection, and ignoring the bending effect on the column produced by the slight eccentricity of its load from the same cause. The problem then becomes one simply of a continuous beam over three spans with restrained ends, the parts having different moments of inertia. The solution is not particularly difficult, and by simple graphical methods the proper arrangement of reinforcement may be readily determined. It is usually found that more column steel is required than had been expected and that less end restraint of the main girders is secured than is often allowed.

Partial loads on continuous members over hinged supports give maximum positive and negative moment curves different from those for full uniform load. In a monolithic structure no supports are as flexible as a hinge should be, and consequently the full values thus obtained can be modified with perfect safety. A considerable study given to the subject seems to show that the amount of steel indicated by the use of 1-12 in computing the moment of a continuous uniform load, placed at both the top and bottom of a continuous member, is ample. The proper distribution may be closely approximated by dividing the axis of a parabola into thirds and

(Continued on page 21.)

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A New Method of Reinforced Concrete Construction.

Hitherto in all systems of reinforced concrete floor construction now in general use, the steel reinforcement is laid in and more or less supported and kept in position by the cement concrete matrix, which in turn is upheld by wooden forms on centering until it has set and hardened, the strength of the whole combination depending entirely upon the setting properties of the cement used in the concrete mixture.

The system recently invented by Mr. S. B. Birds, A.R.I.B.A., a Toronto architect and structural engineer, which he calls the "Lattice-Beam" system, differs from all other systems in that the reinforcement is made self-supporting and rigid, being built up in the form of light section steel lattice work. To this he suspends in an ingenious manner a thin hollow outer shell or lining of concrete, which is reinforced with expanded metal and light steel rods. These shells are moulded in suitable lengths for handling and manipulation, and take the outside shape of the finished floor beams. The space between the floor beams is spanned by a thin supporting slab of concrete reinforced with expanded metal, which forms the upper surface of the slab, providing a bond or key for the concrete filling. These thin slabs are wired up to steel stiffener bars, resting upon the lattice-beam reinforcement, while the stiffener bars form the tension reinforcing rods of the floor slab.

The lattice reinforcement is designed to carry the "dead" load of the floor with a safety factor of 4, the "live" load of the floor being taken care of by the concrete filling and additional tension rods, which are laid within the beam shell alongside the steel lattice-beams. After the lattice-columns, beams, thin shells and supporting slabs are fixed in position, the wet concrete forming the body of the floor is filled in upon them in the same manner as upon the lumber supporting forms in other systems, the thin concrete beam shells and supporting slabs forming the permanent ceiling of the floor below and may be finished off in any manner suitable to the pur-

pose of the room before being fixed in position.

This method of supporting a thin permanent shell of concrete upon a rigid system of reinforcement entirely eliminates the necessity of providing and erecting the expensive timber forms and centering.

The idea seems to be entirely new, has much to recommend it, and is one which doubtless will receive general adoption in course of time. There does not appear to be any objectionable feature about it, and the fact that the lattice reinforcement is designed to take up the dead load of the floor without any assistance from the concrete and will independently withstand an ultimate strain of 300 pounds to 400 pounds per foot of floor area, is likely to appeal favorably to those architects who have looked upon reinforced concrete construction with a certain amount of distrust.

The inventor claims that the system is not more expensive than any of the reinforced concrete systems now in use, as the saving in the cost of material and labor involved in erecting wooden centering more than covers the extra cost of constructing the steel reinforcement in lattice shape.

In any event it should prove a good deal cheaper than the steel skeleton fireproof construction using stanchions and I-beams fireproofed with a 2 inch concrete lining.

All danger of failure due to misplacement of reinforcement, faulty construction of centering, or the too early removal of forms which are the principal cause of the collapse of reinforced concrete construction is entirely absent, and the increased facility for rapid construction is a decided advantage.

We understand that negotiations are in progress for the formation of a construction company to carry out contracts on this system.

The inventor, Mr. S. B. Birds, A.R.I.B.A., of 90 Wellesley street, Toronto, will be pleased to furnish particulars to anyone interested or supply details of the system and estimates of cost for any proposed reinforced concrete construction.

Building Commencing to Boom.

"I have figured on more building this spring than any spring for some time," said a well-known London contractor the other day.

"The outlook for building is very bright. There will not be so many houses built, perhaps, but there are several warehouses and public buildings, and other large structures, which make the prospects for the building trades very good.

"A lot of men are figuring on building if conditions improve, and if the financial situation clears, as I expect it will, the building trades will have a good year."

A busy spring for the contractor is in store for Winnipeg, according to architects of that city. Evidence is quoted in plenty to show that there is work enough now in hand in the draughting rooms of the city to promise a much more active year than 1907 and possibly one equal to 1906 when all records for building were broken. There is still a little uncertainty in the minds of many builders as to the extent of their operations during the coming spring, but that is rapidly passing away and a heavy building trade is practically assured. Not only is this the case for Winnipeg, but a good deal of work is also being projected for points lying outside the city.

Owing to the large increase in the population of Saskatoon incident to the opening for operation of the numerous new lines of railway, the Canadian Pacific, Grand Trunk Pacific and Canadian Northern all centering at Saskatoon, an extensive company has just been organized to build substantial houses to rent to incoming residents.

When frozen earth has to be opened, the usual plan is to build a fire on the spot, and in this way heat the soil so as to soften it. This is not only a tedious method, but one that is very wasteful of fuel. Probably not five per cent. of the heat that is generated is usefully applied. A much more rapid and economical method is to use the fuel for generating steam, and applying the steam to the place we wish to thaw out.

Contracts Department

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

CONTRACTS OPEN.

Alert Bay, B. C.

Rev. John Antle is interested in a project to erect a large hospital here and it is hoped to start construction this spring.

Arnprior, Ont.

Joseph Gaudette will put up a two-storey brick building on Elgin street this spring.

Aylmer, Que.

Tenders have just closed for the construction of a sewerage system; G. L. Dumouchel, secretary-treasurer.

Battleford, Sask.

The ratepayers have approved a by-law to construct a sewerage and waterworks system at a cost of \$90,000.

Brampton, Ont.

A by-law to give fixed assessment to the Crossin Piano Company has been passed.

Chatham, Ont.

Hon. Dr. Pyne, Minister of Education, has been notified of the inadequate fire protection at the McKeough school and this building and certain other urban schools in the province will be examined and reported upon by an inspector of the Department.

Ceylon, Ont.

D. D. McLachlan, of this place, has commenced preparation for building a new hotel on the site of the one destroyed by fire.

Clinton, Ont.

The ratepayers have approved a by-law in favor of the Doherty Organ Company, who will enlarge their business and form a joint stock company with increased capital.

Cainsville, Ont.

The T. H. & B. Railway are negotiating with the council in regard to the projected bridge over their road at this place.

Cobourg, Ont.

Neil F. MacNachtan, Treasurer, will receive tenders up to March 26th for \$20,000 debentures of the United Counties of Northumberland and Durham. The debentures bear 4½ per

cent. interest and are payable January 2nd., 1928. Bids received en bloc or for any amount.

Cornwall, Ont.

The Modern Bedstead Company's new factory was seriously wrecked a day or two ago by the collapse of the water tower.

Dauphin, Man.

W. Smith Jackson, Secretary-Treasurer, will receive tenders up to March 25th or \$14,000 five per cent. twenty-year school district debentures.

Dawn Mills, Ont.

Tenders will be received by H. J. Obeay, Secretary, Building Committee, up to March 21st for rebuilding the Methodist church at this place. Plans at H. J. Obeay's store.

Daysland, Alta.

Camille David is the head of a syndicate which will erect an abattoir and canning factory at a cost of \$100,000. This summer a large public park will be laid out; a hospital to cost \$100,000 will be built; a spacious public school erected and a convent under the direction of the Sisters of Providence will be started, besides many other structures on a small scale.

Edmonton, Alta.

An additional sum of \$48,000 has been voted by the ratepayers for rails and other materials for the municipal street railway system.

Howard Douglas, Commissioner of Dominion Parks, care of Agent of Dominion Lands, will receive tenders up to April 10th for construction of wire fence at Buffalo Park, townships 42, 43 and 44, ranges 6, 7 and 8, province of Alta. Specifications may be obtained from the Secretary of the Department of the Interior, Ottawa; from the Commissioner of Dominion Parks at Banff, Alta., or from any Dominion Lands agent in Western Canada.

Fort William, Ont.

A two-storey block, 50 by 70 feet, will be erected on Simpson street by Peter Abdou, coal merchant.

Halifax, N. S.

R. J. Wilson, Secretary, School Commission, invites competitive plans

and specifications up to April 1st for two new school houses in the western suburbs of this city.

Hamilton, Ont.

The Independent Oddfellows are contemplating the erection of a new temple to cost in the neighborhood of \$100,000. A meeting will be held in this connection on the 26th inst.

The Board of Education are about to take tenders on fire escapes for a number of city schools; estimated cost \$3,500.

A company is being formed to build a large brewery in this city at a cost of \$250,000 and H. Bollinger, of Pittsburgh, has already been instructed to prepare plans.

The Department of Public Works are considering plans for rebuilding the piers and lighthouse at the beach; estimated cost \$25,000.

An eight-room addition will be built at the Sophia street school at a cost of \$32,000. Plans have been prepared for an addition to the Pictou street school; estimated cost \$250,000.

Hastings, Ont.

Rev. William Burns, this town, wants tenders up to April 1st for brick work and other contracts in the erection of the new English church. Plans and specifications may be seen on application.

Kenora, Ont.

The ratepayers have approved a by-law granting immunity from taxation to the Maple Leaf Milling Company and the reconstruction of the big mills is now assured.

L'Avenir, Que.

A project is on foot to build a railway from Melbourne to Sorel, passing through Durham and this municipality, and at a public meeting held here recently it was decided to obtain a charter from the Dominion Parliament and the Quebec legislature.

London, Ont.

A. O. Graydon, City Engineer, wants tenders up to March 23rd for all trades in the erection of the isolation hospital. A. D. Stewart is chairman of the building committee.

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The Government estimates include a sum of \$3,800 for the construction and equipment of a hydro-therapeutic department at the Asylum for the Insane.

The Canada Organ Company of Woodstock, are asking for a free site and \$5,000 bonus to locate here.

Rich, Goodenough & Rhinn, of Detroit, are stated to be divided between this city and St. Thomas as a site for a Canadian location. The concern control one of the largest steel industries in the United States.

The West Shore Electric Railway will build from Grand Bend to this city and other points, and are now applying for an act to empower them to undertake construction.

The North Midland Railway Company have obtained a two year extension from the legislature, but the provisions call for an expenditure of \$150,000 within the next two years and the completion of the line to Stratford and north into Huron within three years. The line from London to Stratford via St. Marys will cost \$800,000. The Company hope to place their bonds this year.

It is announced that the Steel Culvert Company have decided to locate in this city and that they have leased property in the east end to manufacture steel culverts. They have factories at Madison, Wis., and Lyle, Minn.

L. G. Read, consulting engineer of the Colonial Engineering Company, of Montreal, is submitting a proposition to Council for the installation of a producer gas plant; approximate cost \$75,000.

The South Western Traction Company have been granted an extension of time for the construction of their road to Ingersoll.

Mission City, B.C.

H. Windebank has been granted rights to develop power at Silver Creek for an electric lighting system here.

Mono Mills, Ont.

The construction of a rural telephone system for this locality will be entered upon in the spring. Ira Stork is secretary-treasurer.

Montreal, Que.

The Level Crossings Committee have engaged engineer Howard, of the city roads department, to prepare plans for the elevation of the G.T.R. tracks.

The installation of an electric light plant to cost \$182,000 is under discussion. J. R. Barlow is the city surveyor.

The incinerator is to be rebuilt by the city at a cost of \$102,000.

Moose Jaw, Sask.

A by-law to raise \$125,000 for the installation of a sewerage and waterworks system has been approved by the ratepayers.

McLeod & Hamelin propose to erect a largethree-storey departmental store, corner of Main and Fairford streets.

Nelson, B.C.

Work will shortly commence on the extension of the municipal power plant at Bonnington Falls. Cecil B. Smith, of the hydro-electric commission, is the engineer.

New Westminster, B. C.

The Fraser River Sawmills have changed hands and it is understood that large improvements to the plant will be carried out. The purchasers are E. E. and Louis Swift, Chicago, Peter Jensen, Nebraska, and Col. A. A. Davison, of Toronto.

The Sunset Power Company, of Vancouver, have applied for 15,000 inches of water from Tamihy Creek, near the Chilliwack river.

Engineer J. A. Waddell has submitted another set of plans and estimates for the Lulu Island bridge, the cost to amount to \$61,000. The plans are in the hands of the Bridge Committee.

Niagara Falls, Ont.

Application has been made to the Ontario Railway Board for approval of a by-law authorizing the issue of \$15,000 debentures to extend and improve the electric light plant.

Orillia, Ont.

The town council have agreed to provide \$8,000 for an addition to the Collegiate Institute.

On April 6th the ratepayers will vote on a bylaw to raise \$75,000 by debentures for sewer construction.

Owen Sound, Ont.

For an addition to the Boyd street school the Board of Education, are asking council for a grant of \$12,000. The matter has been referred to the finance committee.

Ottawa, Ont.

L. K. Jones, Secretary, Department of Railways and Canals, will receive tenders up to March 20th for the supply of 25,800 barrels of Portland cement for use of Trent canal. Specifications at office of Superintending Engineer of Trent canal.

J. E. Brown, Electrical Superintendent, Municipal Electric Department, will receive tenders up to April 1st for meters, transformer, incandescent and arc lamps, wire globes, carbons, hardware and sundry supplies. Specifications at office of Department.

The Elgin and Canbridge street schools will be enlarged at a probable cost of \$90,000.

Palmerston, Ont.

J. H. Hyndman, town clerk, will receive tenders up to April 14th for the various contracts in the construction of a waterworks system, according to plans and specifications at town clerk's office and at office of consulting engineers, Galt & Smith, Toronto.

Pembroke, Ont.

Mr. Carnegie's offer of \$12,000 for the erection of a public library has been accepted.

The council have approved the report of the public works committee calling for the expenditure of \$33,920 upon drainage and road construction.

Peterborough, Ont.

A deputation from this town recently waited upon the Government to obtain assistance in the building of a floating bridge at Innismore. Representatives of the counties of Stormont, Dundas and Grenville also waited upon the Government a short time ago to ask assistance in the building of bridges.

Portage la Prairie, Man.

The Central Electric Company propose to spend from \$25,000 to \$40,000 in a new building and in enlarging the plant.

Redvers, Sask.

K. C. McKenzie, secretary-treasurer, Hearts of Oak school district, will receive tenders up to April 1st for erection of school. Specifications of A. J. Russell and A. M. Stephens, this town.

Regina, Sask.

Galt & Smith, consulting engineers, Toronto, are making up a report for the enlargement of the waterworks. Construction will probably be started this season.

Renfrew, Ont.

J. A. McArthur, Chairman, Parsonage Committee, wants tenders up to March 20th for the erection of a Baptist Parsonage. Plans and specifications at J. A. McArthur's store.

Sarnia, Ont.

The Ideal Power Washing Machine Company has been organised and will establish here. F. C. Watson is secretary-treasurer.

Saskatoon, Sask.

The newly formed Saskatchewan Power Company, capitalized at \$1,000,000, are applying for incorporation to develop power on the Saskatchewan river.

Stratford, Ont.

Recent building permits include: R. Salvage for a brick house on Hibernia street, W. H. Schenck for two brick veneered houses on Front street and Erie street, and L. Smith for alterations to his residence on Albert street.

Sutton, Que.

The ratepayers have approved a by-law for the installation of an electric lighting system and construction will be started at once.

Thamesford, Ont.

There is a movement among the citizens to erect a library building this summer.

Toronto Junction, Ont.

The town council have decided to procure a site and give a grant of \$2,000 a year towards a public library, by which they will become entitled to a Carnegie grant of \$20,000 for a new building.

Toronto, Ont.

Joseph Oliver, Chairman, Board of Control, will receive tenders up to March 31st for supply of cast iron water pipe for year ending April 1st, 1909, also for laying water mains up to December 31st. Specifications may be seen at office of city engineer.

Simpson & Young, architects, are preparing plans for the erection of a pair of houses on Greenwood avenue, also for a residence on Sheridan avenue. The same firm have just taken tenders for a 3-storey addition to Gough Bros.' premises, corner of Queen and Young.

Tenders are invited by Fred Gelinas, Secretary, Department of Public Works, Ottawa, up to April 24th for the construction of an extension to the breakwater on the south shore of Toronto Island, according to plan and specification at offices of J. G. Sing, Resident Engineer, Confederation Life Building, Toronto; Charles Desjardins, Clerk of Works, Post Office Building, Montreal, and at the Department of Public Works, Ottawa.

Isaac Roadway, of Barrie, has purchased property corner of Gwynne avenue and Queen street, where he will build a carriage factory.

C. H. Heehu has bought a block of land on College, near Markham, and will erect two 3-storey stores on the site.

A large 2-storey structure for a market building will likely be erected in the near future at East Toronto, corner of Gerrard and Main Streets.

City Engineer Rust has prepared estimates for the proposed sea wall. For a timber wall from Bathurst street to

the Humber the cost would be \$740,000 and concrete construction would cost \$1,155,000.

For the better fire protection of the school buildings, improvements have been recommended to the property committee by Building Superintendent Bishop that will entail an expenditure of \$30,000. It is further suggested to replace the York street school by a new building to cost \$35,000.

The public library board are considering sites for a branch library in the east end of the city.

A new Roman Catholic church to cost \$30,000 is to be erected at Riverdale, corner of De Grassi street and First avenue.

Plans for the proposed new viaduct, prepared by City Engineer Rust, have been approved, subject to slight changes, by the consulting engineers and by the Board of Control, and are now in the hands of the Government Engineer, G. A. Mountain.

Recent building permits include: C. R. S. Dinnick, six detached 2½-storey brick dwellings, Brunswick avenue, \$20,000; R. Loukin, two pair 2-storey brick veneered front and roughcast dwellings, Badgerow avenue, \$6,400; M. Rawlinson, 4-storey brick warehouse, St. Joseph street, \$7,500; A. G. Love, 2-storey brick dwelling, Shaw street, \$2,500; Dr. Caryle, three brick attached dwellings, Seaton street, \$6,500; Cameron, Stewart & Co., six detached brick dwellings, Alhambra avenue; \$18,000; W. J. White, three attached 2-storey brick dwellings, Garden avenue, \$6,000; N. Baird, 2½-storey brick dwelling, Bloor street, \$3,000; J. J. Downey, two pair 2-storey semi-detached brick dwellings, Geoffrey street, \$9,000; T. H. Cooper, four detached 2-storey brick dwellings, corner St. George and Admiral road, \$20,000; James Lewis, 2-storey brick dwelling, Margueretta street, \$3,000; Robert Purchase, pair 2-storey semi-detached brick dwellings, Givens street, \$5,000; Williams, Moss & Son, five 2-storey brick dwellings, store and dwelling and galvanized iron stable, College street, \$14,000; R. T. Newton, 2½-storey brick dwelling, Ossington avenue, \$5,000; T. Pennock, pair 2½-storey semi-detached brick dwellings, corner Crocker and Bellwood avenue, \$5,000; H. Galbraith, two pair 2-storey semi-detached brick dwellings, Grace street, \$8,500; Alfred Waldon, pair 2-storey semi-detached brick veneered front and roughcast dwellings, West avenue, \$4,600; Edward Corner, pair 2-storey roughcast dwellings, Clinton street, \$3,000; J. T. Turner, two pair semi-detached brick and stone dwellings, Symington avenue, \$8,000.

Vancouver, B.C.

The erection of a large new church is contemplated by the Mount Pleasant Presbyterians.

The North Vancouver Ferry Company and Johnson Wharf Company will carry out the construction of wharf schemes this season.

F. E. Davison, General Manager of the Consolidated Gold Dredging Company of Alaska, was recently in the city. He states that during the coming summer his company will install two dredges at a cost of between \$350,000 and \$400,000.

Recent building permits include:—Mrs. Thomas Foster, frame store and dwelling, Granville street, \$3,000; McDonald, Wilson & Snider, excavation and basement, Vancouver General Hospital addition, \$15,000; E. O. Cornish, frame dwelling, Hammond street, \$3,800; John S. Bain, frame apartment, Richards street, \$4,500; A. E. Salsbury, frame tenement, Third street \$4,000; J. W. Johnston, frame dwelling, Robson street, \$10,000; Marshall Smith, cement block and steel residence, corner Nelson and Bidwell, \$5,500; Rev. A. McAulay, frame addition, Ninth avenue, \$2,500. J. Evans, frame dwelling, Second street \$3,000; E. Buchart, frame store and dwelling, Thurlow street, \$3,000; J. D. McNeill, frame laundry, and dwelling, Powell street, \$7,000; W. George, frame dwelling, First street, \$3,000.

Victoria, B.C.

Wellington J. Dowler will receive tenders up to March 23rd for \$100,000 city debentures, the first issue of the \$619,000 debentures authorized by the "Water Works Loan Bylaw, 1908."

Competitive plans are being taken this week for the proposed new building of the Agricultural Association.

W. W. Northcott, Purchasing Agent, wants tenders to March 30th for supply of water meters. Specifications may be seen on application at the City Hall.

Dr. Ernest Hall will erect a handsome three-storey brick building on Fort street.

The total amount to be expended this season by the B.C. Agricultural Association in new buildings aggregates nearly \$40,000.

Waterloo, Ont.

The local authorities are considering sites for the proposed new post office and customs building.

Watford, Ont.

J. E. Cowan, secretary, trustee board, wants tenders up to March 27th for renovation of schoolhouse in

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S.S. No. 1 and 13, Brooke and Warwick. Plans at Mr. Cowan's residence, lot 24, con. 6, S.E.R., Warwick.

Welland, Ont.

The cost of the proposed hospital to be erected this season, will be in the neighborhood of \$20,000. A. O. Beatty and G.C. Brown are now dealing with the tenders.

Winnipeg, Man.

The Catholic Club will likely postpone the erection of their new building until the fall.

M. Peterson, Secretary, Board of Control, will receive tenders up to March 19th for supply of brass goods, according to specifications at office of city engineer.

Local architects are reported to be busily engaged in preparing plans for residences and business blocks. Darling and Pearson, architects, will shortly award tenders for the new Bank of Nova Scotia and excavation work will be commenced as soon as the present building on the site is removed. Herbert B. Rugh, architect, is preparing plans for two large apartment blocks to cost in the neighborhood of \$200,000.

Tenders will be received by M. Peterson, Secretary, Board of Control, up to March 29th for a second hand, single track, through truss, two-span steel railway bridge, one span 155 feet to 165 feet in length and the other 100 to 115 feet. The structure is required in connection with the Point du Bois development.

Considerable extensions will be made to the schools in this city. The Mulvey and Strathcona schools will each be enlarged by an addition of nine rooms and it is probable that other buildings will be erected.

Alderman W. J. Cavanagh has plans for the erection of a three-storey business block on Seymour street to cost \$15,000. Mr. Cavanagh will also put up a block on Mount Pleasant, corner of Ninth and Brunswick streets.

In connection with the formation of the Union Lumber Company, capitalized at \$10,000,000, it is stated that another large mill will be erected in the near future. Among the incorporators of the new concern are J. S. Hough and G. F. Galt, of this city.

The location of the new G.T.P. bridge has been finally decided upon. It will stretch east from the foot of Lombard street across to St. Bonifae.

A bylaw to raise \$600,000 by debentures for the purchase of school sites and erection of new buildings will be submitted to the ratepayers.

Woodstock, Ont.

Competitive plans are invited up to March 31st by the Board of Education for an eight-room public school building; estimated cost \$20,000. W. A. Reid, secretary-treasurer.

CONTRACTS AWARDED.

Toronto, Ont.

Simpson & Young, architects, have awarded the contract, all trades, for the erection of a verandah at P. Jamieson's residence, Rosedale, to Cairns & Firth, this city, at \$4,000.

London, Ont.

Jones Brothers, of this city, have been awarded the contract for the erection of the new hygienic institute.

Alvinston, Ont.

The contracts for the abutments and floor and for the superstructure of the McKellar bridge have been awarded respectively to Dugald MacIntyre, of this town, and to Jenks & Djiesser, of Port Huron and Sarnia. A. S. Code is the engineer in charge.

Winnipeg, Man.

Foley Bros., Larsen and Stuart, contractors, this city, are reported to have the contract for the section of the G.T.P. east of the French river. The contract is said to involve \$6,000,000.

Bids.

Ottawa, Ont.

Tenders for the construction of 365 miles of the National Transcontinental Railway, covering six sections between Moncton and Lake Nepigon, have just been opened. The awards will not be made for some weeks. For section No. 1, from a point 58 miles west of Moncton to the crossing of the I.C.R., a distance of 40 miles, the G.T.P. was the tenderer. For section No. 2, covering the next 87 miles westward to the river Tobique, the tenderers were MacDonald & O'Brien and the G.T.P. For section No. 3, covering the next 31 miles westward from Tobique river to a point 2½ miles west of Grand Falls, N. B., the tenderers were Craig & Thompson, McDonald & O'Brien, M. P. & J. T. Davis, Kennedy & MacDonald, Willard Kitchen Co., Trites, McPhail, Moore & Miller, and the G.T.P. For section No. 4, extending 52 miles westward from the Interprovincial boundary of New Brunswick and Quebec, the tenderers were O'Brien and Fowler, M. P. & J. T. Davis and the G.T.P.

For section No. 5, running westward 100 miles from a point 8 miles west of Abitibi river in Northern Ontario, the tenderers were E. F. & G. E. Farquier and the G.T.P. For section 6, running 75 miles west of Lake Nepigon, the tenderers were J. McArthur, E. F. & G. E. Farquier, Chambers Bros., McQuigge & Caffrey, and the G.T.P.

Vancouver, B.C.

Armstrong & Morrison and Ironsides, Rannie & Campbell were the only tenderers for the substructure and temporary bridges over False Creek at Granville street and Westminster avenue. The awards will be announced shortly.

Fires.

Sydney Hotel, Halifax, N.S., property of P. Elroy; loss \$25,000

Convent building of Sisters of Charity, Cape Ste. Ignace, Que.; loss \$20,000.

Sawmills of William Scott Lumber Company, Fredericton, N.B.; loss not ascertained.

Business Notes.

Aemilius Jarvis and Company have been awarded \$20,000 county of Hastings bridge debentures, bearing 5 per cent. interest, and payable over a period of twenty years.

G. A. Stimson and Company, of Toronto, have purchased \$160,000 bonds of the town of Carman, Man., bearing 5 per cent., and maturing in 20 annual instalments.

The finance committee of the Montreal city council have decided to call for tenders for their new loan of \$5,000,000 which will be spent on civic improvements. The loan has excited considerable interest in money centres from Montreal to New York, Paris and London, and numerous enquiries have been received. The big financial institutions advised the city that the present was a good time to float the loan and the city authorities decided to act upon this advice at once. The tenders will be opened on March 27. The loan is for 40 years at 4 per cent.

Damien Cyr & Son, sash and door manufacturers, St. Rose, Que., have dissolved partnership.

Aubertin & Falardeau, carpentry contractors, Montreal, Que., have registered.

Ion Brothers & Company, lumber dealers, Montreal, Que., have registered.

TENDERS AND FOR SALE DEPARTMENT

PARTNERSHIP WANTED

Engineer with about \$10,000 desires partnership with Contractor engaged in railroad or other public works, or with structural engineer. Must bear strictest investigation. Reply Box 125, CONTRACT RECORD. 12

SUPERINTENDENT OR FOREMAN

I have held the Position of Superintendent and Foreman in Canada on Reinforced Concrete Construction for the past 6 years, before that I was superintendent and foreman on Mill Construction, Wharf Building and Railway Construction. Can produce good work at minimum cost and am open for re-engagement on any of the above works. Box 123 CONTRACT RECORD, Toronto. 12

FOR SALE

LARGE CONCRETE PLANT

20 acres of splendid land on T. H. and B. Railway; near Welland, Ontario; with buildings, machinery and dry houses, for the manufacture of concrete blocks and bricks in all shapes. For sale and terms, apply to N. W. PORTER, Esq., Arlington Hotel, Welland, Ont. 13

TENDERS

Will be received in connection with all the trades required in the erection of a Residence in Rosedale up to **SATURDAY, MARCH 21st.**

The plans and specifications can be seen at the offices of the undersigned. The lowest or any tender not necessarily accepted. DARLING & PEARSON ARCHITECTS, Toronto. 12

FOR SALE.

One 7 x 12 Beatty Hoisting Engine with swinger, and stiff leg derrick with clam shell attachment, also one one 7 x 12 Beatty Hoisting Engine, one Beatty swinger and one set of stiff leg derrick irons. All in first-class condition. For particulars address THE CADWELL SAND & GRAVEL CO. Windsor, Ontario. 13

Plans Wanted

Competition plans wanted for Zion Lutheran Church; to be in the hands of the Committee by March 31st, 1908. All information in regard to same can be had from J. G. Schmidt, Stratford. The Committee do not bind themselves to accept any plan. 12

NOTICE

Sealed bids will be received at the office of the City Clerk of Vancouver, British Columbia, up to noon of **SATURDAY, APRIL 4th, 1908,** for the manufacture and erection of the Superstructures of the new Bridges over False Creek at Westminster avenue and Granville street. Estimated weight of structural steel, about 2,800 tons.

Plans and specifications will be on file at the City Engineer's office, Vancouver, on and after **SATURDAY, MARCH 14.** Copies of all the papers may be secured from Waddell and Harrington, Consulting Engineers, Kansas City, Mo., upon the receipt of a deposit of twenty-five dollars, which will be refunded upon return of the plans and other papers in good order. 14

TENDER FOR PLANS

Wanted.—Plans for a four-room addition to Boyd street School, Owen Sound, together with an estimate of cost of such addition.

Plans will be received up to and including March 31st inst., to be addressed to the Secretary of the Board of Education.

The Board does not bind itself to accept any Plan; and will only pay for the Plans used.

JNO. RUTHERFORD, Secretary Board of Education. Owen Sound, March 12th, 1908. 13

TENDERS FOR CEMENT

Tenders will be received by the undersigned up till noon on

Wednesday, April 1st, 1908

for the supply of Portland Cement required by the Corporation of the Town of Galt for the coming season. The quantity is estimated at 2,000 barrels more or less. The lowest or any tender need not necessarily be accepted. Specifications furnished on application to

JOSEPH McCARTNEY, Town Clerk.

Galt, March 7th, 1908. 12

CITY OF SHERBROOKE.

Debentures For Sale

Sealed tenders will be received by the undersigned up to noon of **FRIDAY THE TWENTIETH DAY OF MARCH, A.D., 1908,** for the purchase of **ONE HUNDRED AND SEVENTY THOUSAND DOLLARS (\$70,000.00)** worth of twenty-five years annuity debentures of the City of Sherbrooke bearing interest at five per centum per annum. Interest and Principal payable in half yearly payments of **FIVE THOUSAND NINE HUNDRED AND NINETY THREE DOLLARS AND EIGHTY SIX CENTS.** On the 2nd October and April in each year.

Tenders to be marked "Tenders for debentures." For copies of by-laws and other information apply to the undersigned.

F. J. GRIFFITH, Secretary-Treasurer. 12

Sherbrooke, 27th February, 1908.

Notice to Contractors CIVIC SUPPLIES

Sealed tenders, addressed to the Chairman of the Board of Control, City Hall, Ottawa, will be received by registered post only, up to 12 o'clock noon, **TUESDAY, THE 24TH DAY OF MARCH, 1908,** endorsed Tender for "Brick", "Broken Stone", "Curbing", "Cement", "Plank and Cedar", "Sand", "Vitriolized Clay, Pipe", "Brass Work", "Castings", "Cast Iron Pipe", "Hydrants and Valves", "Lead Pipe and Pig Lead", "Oils and Grease", or "Street Sprinkling Cars".

Specifications, forms of tender and full particulars may be obtained at the City Engineer's Office, City Hall, Ottawa.

The Corporation does not bind itself to accept the lowest or any tender.

NEWTON J. KER, City Engineer. 12

Ottawa, March 5th, 1908.

TENDERS

Town of Palmerston, Ont.

WATER WORKS

Sealed tenders will be received by the Town Clerk until 8 p. m. **TUESDAY, APRIL THE 14TH, 1908,** for the following CONTRACTS:—

CONTRACT A

Subdivision (1). Labour, etc., for constructing water works system. Subdivision (2). Cast iron water pipe, valves and hydrants.

CONTRACT B

The supply and erection of a steel Stand Pipe. Plans and specifications may be seen and forms of tender obtained at the office of the Town Clerk, Palmerston, or at the office of the Consulting Engineers.

The lowest or any tender not necessarily accepted. Messrs. Galt & Smith, J. H. HYNDMAN, Esq., Consulting Engineers, Town Clerk, 23 Jordan St., Toronto. 14

Debentures For Sale VILLAGE OF ELMIRA

Sealed tenders will be received by the undersigned up to 7 o'clock p.m. on the 6th DAY OF APRIL, 1908, for the purchase of \$7,500 4 1/2 per cent. Debentures, payable in twelve years, re loan to "Elmira Interior Woodwork Company, Limited," and \$5,000.00 4 1/2 per cent. Debentures payable in thirty years, re Waterworks.

Particulars from the undersigned.

No tender necessarily accepted.

JOHN H. RUPPEL, Clerk. 14



TENDERS

Moose Jaw Court House.

Sealed tenders addressed to the Deputy Commissioner of Public Works, Regina, and endorsed on envelope "Tender for Moose Jaw Court House," will be received by the undersigned up to 4.30 p.m. Monday, March 23rd, 1908, for the erection of a Court House building at Moose Jaw.

Each tender must be accompanied by an accepted cheque for \$5,000, which deposit will be forfeited if the tenderer fails to execute the contract and bond when requested and will be returned when the contract is signed.

The right to reject any or all tenders and to waive any defects or irregularities therein is to be at the discretion of the Commissioner of Public Works.

Plans, specifications, form of tender and all information may be obtained on application to the undersigned or to Messrs. Darling & Pearson, Architects, Regina.

The unauthorized insertion of this advertisement will not be paid for. F. J. ROBINSON, Deputy Commissioner of Public Works, Regina, Feb. 8th, 1908. 12



DEPARTMENT OF RAILWAYS AND CANALS

TRENT CANAL.

NOTICE TO DEALERS IN CEMENT.

SEALED TENDERS, endorsed "Tender for Cement," will be received by the undersigned, at 10 o'clock on Friday, the 20th March, 1908, for the supply of 25,800 barrels of Portland Cement, for the use of the Trent Canal.

Specifications and forms of tender can be procured at the office of the Superintendent Engineer of the Trent Canal, on and after Monday, the 9th March.

Contractors are requested to bear in mind that tenders will not be considered, unless made strictly in accordance with 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 \$5,000 made payable to the order of the Minister of Railways and Canals 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 lowest or any tender not necessarily accepted.

By order,

L. K. JONES, Secretary.

Department of Railways and Canals,

Ottawa, 6th March, 1908.

Newspapers inserting this advertisement without authority from the Department will not be paid for. 14

No FOR WA' LA

TENDE addr trol, City 1 31, 1908, fo year endia Also for ember, 190 Envelop on the outi Specifica the office o The usu scribed by The lowe

City Hall, 1

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The shi from setti to cause s points as slabs and beams; un stretches o gle operat taken in t inforcemen tinuous ty even for i with such



Notice to Contractors

FOR THE SUPPLY OF CAST IRON WATER PIPE AND FOR THE LAYING OF WATER MAINS FOR 1908.

TENDERS will be received by registered post only, addressed to the Chairman of the Board of Control, City Hall, Toronto, up to noon on Tuesday, March 31, 1908, for the supply of Cast Iron Water Pipe for the year ending April 1, 1909:

Also for the laying of water mains up to 31st December, 1908.

Envelope containing tenders must be plainly marked on the outside as to contents.

Specifications and forms of tender may be obtained at the office of the City Engineer upon application.

The usual conditions relating to tendering as prescribed by City By-law must be strictly complied with.

The lowest or any tender not necessarily accepted.

JOSEPH OLIVER (Mayor),

Chairman, Board of Control.

City Hall, Toronto, March 9th, 1908.

The Necessity of Continuity in the Steel Reinforcement of Concrete Structures.

(Continued from page 14)

making the top and bottom steel overlap the amount shown by the centre third. For various reasons, too, it is wise to run at least one rod from end to end of a continuous member along its bottom, in spite of the theoretical wastefulness involved. Some engineers also run one throughout along the top, and this is absolutely essential on short spans adjacent to longer ones. In such cases, a careful analysis should always be made. Even in the floors of ordinary warehouses, deflection experiments show considerable upward movement when alternate bays are loaded. Excessive loads, located in this way, might easily cause dangerous cracking in the unloaded bays, while the loaded ones were perfectly safe.

The shrinkage which takes place from setting is not usually sufficient to cause any trouble, except at such points as connections between floor slabs and the deep ribs of girders and beams; unless very large, long or deep stretches of work are placed in a single operation. Great care should be taken in the arrangement of the reinforcement at such points, the continuous type being altogether best, even for floor slabs. In connection with such slab steel, numerous stir-

rups should be provided to tie together the stem and the flanges of the T-beam which is the actual statical condition of the member when under load. It may not be out of place to remark at this point that the actual effective width of flange in such T-beams is probably not nearly as wide as is assumed by many engineers. Care should be exercised in the design of the reinforcement of heavy floor girders to see that enough reinforcement runs through the flanges of the T, across the top, to provide for the secondary bending stresses which are developed by the shearing stresses close to the stem. This condition is usually overlooked in connection with the members which run parallel with the floor slab reinforcement. Members running in the opposite direction secure ample assistance from the regular slab rods. Also, in continuous members, for the ordinary loads, the neutral axis is so high in the vicinity of points of support that little is to be feared from possible compression failures at such points unless the stress condition within the zone of compression is aggravated by the approach of a diagonal tension failure. The latter is the one shown indirectly as the cause of rupture in all the tests of continuous members with which the writer is acquainted, and to obviate which, special care should be exercised in design work.

That the computed compressive stresses run very high shows either that the confined condition adjacent to points of support makes such stresses possible, or that wrong methods have been used in their calculation or wrong assumptions made on which to base computations. All these are probably true. In designing the reinforcement for such continuous members, care should therefore be exercised to provide as ample steel as possible to assist the concrete in resisting compressive, shearing, and diagonal tensile stresses. Perhaps, it is somewhat beside the point to state here that all tests of continuous members show great deficiency of the original concrete to withstand the developed diagonal tensile stresses without the addition of considerable steel in the form of stirrups or other heav-

ier rods, either vertical or inclined, or both, and properly anchored at the ends. But the reinforcement for few buildings is designed with such an amount of reinforcement at those points and if continuous members are to be considered at all, the present practice is open to considerable improvement. That structures remain standing is no criterion of their proper design and construction. The condition of numerous country highway bridges is a notorious example of the existence and continued use of sometimes actually dangerous structures.

Change of temperature is a potent cause of innumerable, unknowable, secondary stresses in many structures. In such buildings as tanks and long walls in which cracks are inadmissible, absolute continuity of reinforcement is essential. Nothing further need be said concerning such structures, except that it is not usually advisable to reinforce retaining walls so as to prevent cracking. Even where water-tightness is necessary it seems wisest usually to undertake to secure it by the employment of a water-tight expansion joint, together with a waterproofing by some method of the portions of wall between joints. To be sure, in one instance of a reinforced concrete face for a high rockfill dam in the Sierra Nevada Mountains, a recommendation was made to carefully reinforce areas aggregating approximately 20,000 square feet, rather than to make use of waterproof expansion joints under hydraulic heads over 100 feet high.

In buildings of relatively small dimensions as to ground area, no contraction joints are necessary, especially in the upper storeys. In long buildings, some joints may be deemed advisable in order to obviate the heavy tensile secondary stresses which must sometimes exist, and which show themselves by cracks, sometimes at unsightly and occasionally at dangerous points. In small buildings, the employment of numerous distributing rods through the floors at right angles to the regular carrying rods, will usually be sufficient as far as the floors themselves are concerned. Around window and door openings,

special reinforcement should always be provided to prevent the formation of the cracks which often start at all four corners, and extend for short distances into the walls. Roofs are subject to extraordinary changes of temperature in their several parts, and need the greatest of care in the design of their reinforcement, especially when the slabs are treated as the flanges of long-span roof girders.

In larger buildings, clean-cut joints may be installed, and can be placed at the centres of panels by providing cantilever beams and girders half a

span in length on each side. Such joints should always be covered with an elastic waterproof coating to shed the water falling on the floors in case of fire. This discussion has been mainly on the subject of the prevention of cracks, a series of prescriptions for the overcoming of certain symptoms. While simple tension cracks on the bottoms of beams at their centres are not usually at all dangerous, since they commonly develop at comparatively low steel stresses, still the owner is not aware of this fact, and is not readily con-

vinced that there is no real defect when his building commences to crack. He wants a perfect structure and is entitled to receive it, particularly when possible danger of the formation of rust exists when cracks have formed, and more particularly when a slightly different arrangement of reinforcement would entirely eliminate the fancied or real trouble in question. Logic thus seems to dictate that all structures which are at all monolithic in character, thus having members continuous over supports or through floor levels should have their rein-

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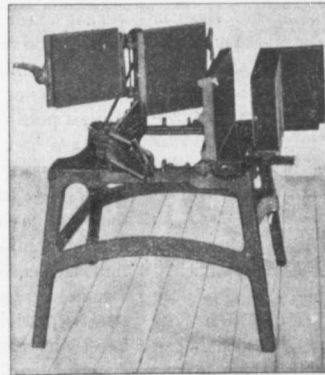
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standstill, and threw hundreds of thousands of men out of work. It crowded the steerages of east-bound steamers with scores of thousands of workmen who chose to return with their savings to their native lands until the demand for labor should call them back here again. But the country is fundamentally prosperous, and in most sections there is evident a gradual resumption of activity and a great deal of confidence as respects the future. Quite apart from the transient currency panic, there has set in a widespread process of what is called liquidation. Loans have been called in and credits are undergoing readjustment upon a hard times basis.

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**Royal Commission's Report on
Quebec Bridge Disaster.**

The report of the Royal Commission appointed last September to investigate the cause of the Quebec bridge disaster was presented to Parliament on March 9th by Hon. Geo. P. Graham. The findings of the Commission are in effect that the catastrophe was due to basic defects in the design of the structure. There was no defect in the material, no lack of care in construction, no deficiency of ordinary professional knowledge on the part of all concerned, but an error in judgment on the part of the designing and consulting engineers was directly responsible for the disaster. The finding of the Commission was as follows:

(a) The collapse of the Quebec bridge resulted from the failure of the lower chords in the anchor arm near the main pier. The failure of these chords was due to their defective design.

(b) The stresses that caused the failure were not due to abnormal weather conditions or accident, but were such as might be expected in the regular course of erection.

(c) The design of the chords that failed was made by Mr. P. L. Szlapka, the designing engineer of the Phoenix Bridge Company.

(d) This design was examined and officially approved by Mr. Theodore Cooper, consulting engineer of the Quebec Bridge & Railway Company.

(e) The failure cannot be attributed directly to any cause other than errors in judgment on the part of these two engineers.

(f) These errors of judgment cannot be attributed either to lack of common professional knowledge, to neglect of duty, or to a desire to economize. The ability of the two engineers was tried in one of the most difficult professional problems of the day, and proved to be insufficient for the task.

(g) We do not consider that the specifications for the work were satisfactory or sufficient, the unit stresses in particular being higher than any established by past practice. The specifications were accept-

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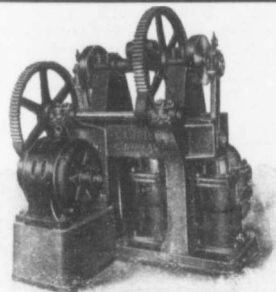
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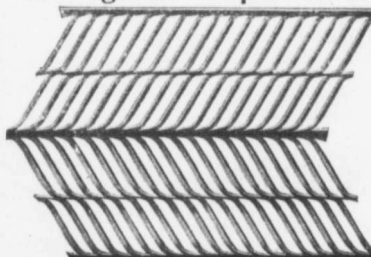


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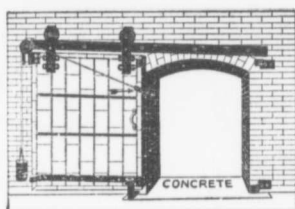
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(h) A grave error was made in assuming the dead load for the calculation at too low a value, and not afterwards revising this assumption. This error was of sufficient magnitude to have required the condemnation of the bridge if the details of the lower chords had been of sufficient strength because, if the bridge had been completed as designed, the actual stresses would have been considerably greater than those permitted by the specifications. This erroneous assumption was made by Mr. Szapka and accepted by Mr. Cooper, and tended to hasten the disaster.

(i) We do not believe that the fall of the bridge could have been prevented by any action that might have been taken after August 27th, 1907. Any effort to brace or take down the structure would have been impracticable owing to the manifest risk of human life involved.

(j) The loss of life on August 29th, 1907, might have been prevented by the exercise of better judgment on the part of those in responsible charge of the work for the Quebec Bridge & Railway Company, and for the Phoenix Bridge Company.

(k) The failure on the part of the Quebec Bridge & Railway Company to appoint an experienced bridge engineer to the position of chief engineer was a mistake. This resulted in a loose and inefficient supervision of all parts of the work on the part of the Quebec Bridge & Railway Company.

(l) The work done by the Phoenix Bridge Company in making the detail drawings and in planning and carrying out the erection, and by the Phoenix Iron Company in fabricating the material was good and the steel used was of good quality. The serious defects were fundamental errors in design.

(m) No one connected with the general designing fully appreciated the magnitude of the work nor the insufficiency of the data upon which they were depending. The special experimental studies and investigations that were required to confirm the judgment of the designers were not made.

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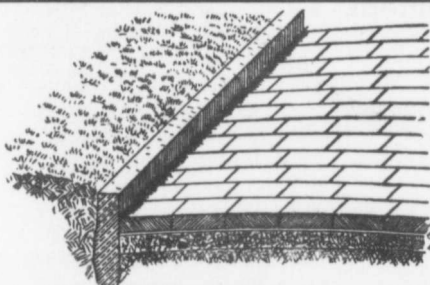


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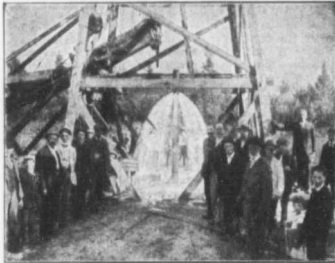
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(n) The professional knowledge of the present day concerning the action of steel columns under load is not sufficient to enable engineers to economically design such structures as the Quebec bridge. A bridge of the adopted span that will unquestionably be safe can be built, but in the present state of professional knowledge a considerably larger amount of metal would have to be used than might be required if our knowledge were more exact.

(o) The professional record of Mr. Cooper was such that this selection for the authoritative position that he occupied was warranted, and the complete confidence that was placed in his judgment by the officials of the Dominion Government, the Quebec Bridge & Railway Company, and the Phoenix Bridge Company was deserved.

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There is being mooted at Winnipeg a proposition to establish an industrial department building to assist in the industrial development of the city. The idea is to afford a place where the promoters of infant industries, the branches of great eastern manufacturing establishments and the owners of patents may be given an opportunity to display their products. Manufacturing space in the establishment would be rented at a reasonable figure and local investors would thus be enabled to watch the development of promising projects or manufacturies.

It is said that over 50 inquiries have been lately received by the Winnipeg Industrial and Development Bureau from Eastern Canadian manufacturers, patentees and manufacturers from the United States, enquiring as to existing conditions as to rent, accommodation, power, etc., in that city. The institution of "an Industrial Department Building" would probably lead to the beginning of many new industries in Winnipeg.

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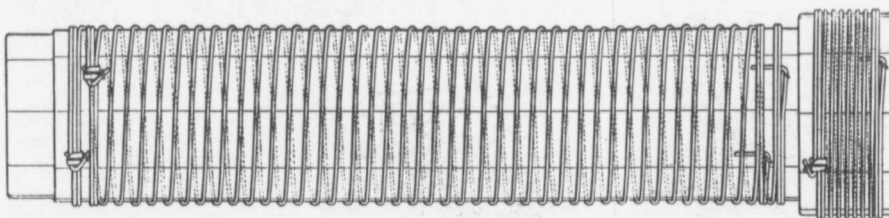
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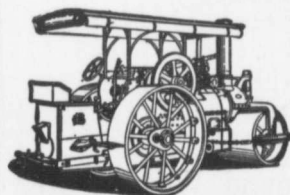
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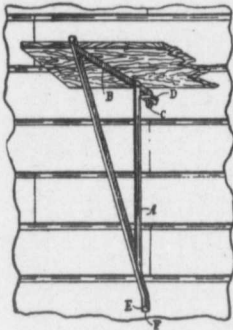
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