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NEW COMPANIES.

VANCOUVER, B. C.—Fraser River Packing Co., incorporated; capital, \$250,000, trustees, W. G. Johnston, C. J. Marani, and Harry Rhodes.

CAMPBELLFORD, ONT.—Northumberland Paper & Electric Co., incorporated; capital stock, \$100,000, to acquire the plant of the Northumberland Paper & Egg-Case Co., and to manufacture pulp, paper, etc.

TORONTO, ONT.—Prismatic Glass Co., applying for incorporation; capital stock, \$5,000; to manufacture prismatic glass.—Canonto Mica & Mineral Co., incorporated; capital, \$22,000; to mine, cut and dress mica, etc.

ST. JOHN, N. B.—Gold Car Heating Co., Ltd., seeking incorporation; capital \$250,000, to manufacture heating apparatus of all descriptions; applicants, Hon. Russell Sage, Edward E. Gould, W. E. Banks, and F. J. Menzie, of New York, Hugh H. McLean, of St. John.

CONTRACTS OPEN.

PHELSTON, ONT.—A new hotel is to be built here.

SUTTON, QUE.—S. N. Boright will erect a saw mill here.

TRENTON, ONT.—There is talk of a paper mill being built here.

HOWE SOUND, B. C.—George Gibson is about to erect a shingle mill.

HASTINGS, ONT.—W. P. Plant, of Norwood, will build a foundry in this town.

SNOW ROAD, ONT.—R. Wood will build a saw mill on the Mississippi river.

ALERT BAY, B. C.—The Ross-McLaren Co. propose erecting a saw mill at this point.

PORTNEUF, QUE.—It is rumored that an electric light plant will be installed here.

PARK HILL, C. Both sides of Main street will be laid with granolithic next spring.

EXETER, ONT.—The town will put down 3 blocks of granolithic sidewalks in the spring.

PAKENHAM, ONT.—J. H. Francis offers to put in an electric light plant to light the streets.

CLINTON, ONT.—S. Cooper, whose planing mill here was burned last week, will rebuild at once.

NEW EDINBURGH, ONT.—The corner stone of the new Lutheran church will be laid on Sunday next.

STRATFORD, ONT.—Plans have been invited by the Stratford Curling Club for a rink to be 160 x 32 feet.

GUELPH, ONT.—An extension to the market building, at a cost of \$1,300, is under consideration by the Council.

STIRLING, ONT.—There is talk of an electric railway connecting the village with the C. P. R. at C. O. Junction.

MONCTON, N. B.—The Imperial Oil Company contemplate the erection of a storage tank with a capacity of 2,100 barrels.

ST. THOMAS, ONT.—The Lake Erie railway route from Ridgetown to St. Thomas is being surveyed by Mr. Owen McKay.

KINGSTON, ONT.—Power & Son, architects, are receiving tenders this week for alterations to Craig & Co.'s warehouse building.

SPALLUMCHEEN, B. C.—Tenders will be received by R. S. Pelly, Clerk, until the 2nd of December, for the purchase of \$20,000 of debentures.

TAKUSH HARBOR, B. C.—An English company contemplate building a large saw mill here, particulars of which may be obtained from the authorities.

CHATHAM, ONT.—The electric railway projectors have made a survey of the town and pronounce the prospects good. They will invest \$150,000 in the enterprise and will build a loop line in the city, and give a six minute service.

PORT STANLEY, ONT.—The townspeople wish the harbor deepened to 14 feet, and the government will be requested to have the work carried out.

WINCHESTER, ONT.—The ratepayers of this village are reviving the agitation for an electric railway between Morrisburg, Winchester and Ottawa.

ST JOHN, N. B.—The school trustees have decided on the erection of a new High School. It is not probable that work will be commenced until next year.

HULL, QUE.—The erection of an iron bridge over the slides is being urged, and a deputation will probably interview the Minister of Public Works regarding the matter.

QUEBEC, QUE.—A. J. Pageau, architect, is preparing plans for a four-storey building for M. Lortie and for two hotels for the county of Gaspé to be erected next spring.

COLDWATER, ONT.—Sawyer Bros. have made arrangements to erect four new brick stores, and several other buildings are said to be in contemplation by residents.

CALGARY, N. W. T.—The Calgary Gas and Water Works Company, limited, is applying to Parliament for permission to divert the waters of the Bow River for use in Calgary.

PORT PERRY, ONT.—A scheme is on foot to construct an electric railway from Kincardine to this town. Reeve Curts has raised the sum of \$500 to pay surveying expenses.

ST. LAMBERT, QUE.—The by law to authorize the council to construct waterworks and sewerage systems, at a cost of \$75,000, was sanctioned by the ratepayers on Saturday last.

NEWMARKET, ONT.—Tenders are invited until the 11th inst., for the purchase of the electric light plant and franchise, for which there is a ten years contract. Address H. S. Cane.

OWEN SOUND, ONT.—The Minister of Public Works has promised that action will shortly be taken in regard to the construction of a dry dock here by the Dominion Government.

PERTH, ONT.—The Facer Car Wheel Company will build a factory here. The Perth Canning Co. will erect a factory at once. There will be two buildings 80x30 ft., with boiler house and cooling house.

ORILLIA, ONT.—Mrs. Wm. M. Harvey, of this town is about to build a very fine residence on lot, corner of Peter and Tecumseth sts. Mr. Geo. W. Gouinlock, of Toronto, is the architect, and the plans and specifications are ready for receiving tenders.

HUNTSVILLE, ONT.—Mr. V. M. Roberts, C. E., of St. Catharines, has made a survey of the town with a view of establishing a system of waterworks and electric light. He recommends building a reservoir on the hill and pumping the water into it from Hunter's Bay. The

cost would be about \$15,000 for waterworks and \$10,000 for electric light.

BROCKVILLE, ONT.—A new heating system for the public building here is badly needed, the Grand Jury and Inspector Chamberlain having condemned the present system several times. It is probable a new system will shortly be introduced.

WINNIPEG, MAN.—There are said to be good prospects of the early extension of the C. & E. railway from McLeod to the Great Northern.—The supply committee of the school board have decided to call for tenders for 500 new desks to be placed in the schools.

PEMBROKE, ONT.—The directors of the Pembroke Southern railway have sent out a party, consisting of J. A. Thibideau, F. E. Fortin and Thos. MacKie, of this town, to locate the line through the township of Wilberforce, and it now looks as if the line would be built.

BRANDON, MAN.—Tenders are invited by P. E. Durst, Chairman Board of Works, until Monday, the 18th inst., for the construction of a highway bridge across the Assiniboine river. Plans may be seen and information obtained at the office of H. G. Dickson, City Engineer.

PORT ARTHUR, ONT.—At a public meeting held a few days ago, the proposal to establish a pulp mill, with a sufficient power to operate the street cars, and to construct a system of waterworks, was approved of, and a by-law will be submitted to the ratepayers to provide funds.

BRANTFORD, ONT.—A movement is on foot to form a cold storage company here, and to build large warehouses in connection therewith.—It is proposed to submit a by-law to the ratepayers authorizing the Council to expend the sum of \$20,000 in converting old rookeries into public squares and gardens.

TAVISTOCK, ONT.—The new hotel to be erected for J. J. Wettlanfer, plans for which were prepared by D. G. Baxter, architect, of Stratford, will be 46 x 60 ft., three stories high, containing modern improvements and heated by furnace, cost about \$7,000. It is estimated that 100,000 bricks will be required in its construction.

COLLINGWOOD, ONT.—A by-law will be submitted to the ratepayers to provide for a loan of \$25,000 to supplement the Dominion Government grant of \$75,000 for the deepening of the harbor.—Mayor Callary, Reeve Nettleton and F. Moberly, C.E., have been appointed to interview the government at Ottawa regarding a bonus to the proposed Air Line Railway between this port and Toronto.

LONDON, ONT.—Charles Taylor has taken out a permit to erect a story and a half brick house on Horton street, to cost \$1,000.—The Western Fair Board propose making extensive improvements, including entirely new buildings and grand stands.—Tenders for erecting two brick residences are invited by McBride & Farncombe, architects, until the 11th inst.—Mr. C. G. Horetzky, engineer of the Public Works Department, Toronto, was in the city on Tuesday last for the purpose of advising Dr. Cl. T. Campbell, Chairman of the Board of Health, with reference to the solution of the sewerage problem.

HAMILTON, ONT.—Engineer Barrow is preparing a plan for the disposal of the sewage of the block bounded by Duke, Hunter, Bay and Caroline streets, rendered necessary by the construction of the tunnel.—Mr. Keating, C.E., of Toronto, has presented his report on the improvements necessary to the waterworks system. He recommends that the city be divided into two sections, with a new pumping station on Sherman ave., and that several of the smaller mains be replaced by larger ones. The cost is estimated at \$251,429, with \$23,371 additional

for engineering, contingencies, etc. The principal items are as follows: 26,000,000 gallon pumping engine, including boilers, \$70,000; engine house, boiler room and coal sheds, \$22,500; 15,800 ft. 20-inch pipe, laid, \$71,100; 32,800 ft. 12-inch pipe, laid, \$52,000; 1,000 ft. 36-inch conduit into lake, \$15,000.—Building permits have been granted to John Henry for a two-story brick dwelling on West avenue, to cost \$1,100, and to A. W. Peene, for four two-story brick dwellings on Aberdeen avenue and Hilton street, to cost \$7,000.

MONTREAL, QUE.—At the last meeting of the Fire Commissioners it was decided to recommend that Henault's lot on Notre Dame street be purchased and that a new fire station be erected thereon.—Eric Mann, architect, has prepared plans for a skating rink to be erected in St. Jean Baptiste Wood, and also for a large warehouse for: J. Macdonald, of St. John, Que., to be erected in this city.—C. Lufort, architect, is preparing plans for a \$5,000 residence at Notre Dame de Grace for Mrs. D. Decarie, and tenders will be called for at an early date.—Notice is given of application to Parliament for an act to incorporate the Montreal and St. Lambert Bridge & Electric Railway Company which proposes to construct a railway and highway bridge across the St. Lawrence river at Montreal. Power is asked to construct and operate railways from the terminal of the bridge to the eastern boundary of the county of Chambly and the western boundary of the county of Laprairie.—Building permits have been granted as follows: W. Kemey, alterations and addition to two houses, University street, cost \$4,000; B. Ledoux & Co., warehouse, seven stories, Osborne st., cost \$18,000; C. Vezina, store building, St. Catherine st., cost \$3,000; G. Dumais, brick tenement building, St. Germain street, cost \$3,500; W. Martin, two stone front tenement buildings, Cherrier street, cost \$6,500.

OTTAWA, ONT.—It seems probable that a start will shortly be made on the proposed Georgian Bay and Ottawa canal. At a recent meeting of the Council of the Board of Trade, it was decided to petition the Ontario and Quebec governments for land grants.—It is again rumored that the erection of a new Geological museum is to be proceeded with, but no definite action has as yet been taken, as a grant must first be made by parliament before the work can be commenced.—Tenders are invited by E. F. E. Roy, Secretary of the Department of Public Works, until Tuesday, the 10th of December next, inclusive, for the construction of an additional length to the wharf and the formation of a tidal basin at Rimouski, Que., according to a plan to be seen at the Court House, Rimouski, and at the Department of Public Works, this city.—George and Matthew Orme have purchased a lot on the North side of Sparks street and propose erecting a store thereon. A. J. Stevens has arranged to erect another store adjoining, while Nicholas Slater and Major Sherwood propose to erect several stores. The plans are now being prepared, but operations will not be commenced until next spring.—The Central Fair Association propose erecting new buildings, and have requested the Council to submit a by-law to the ratepayers to raise the sum of \$40,000 for the purpose.—The Montreal and Ottawa Railway Co. will apply to parliament next session for authority to proceed with the completion of its railway.—An influential deputation of citizens last week waited upon the government urging the construction of two new bridges over the Rideau river, one at Somerset street and one at Maria street. Consideration was promised.—At a public meeting of ratepayers held last week, the question of constructing a complete drainage system was discussed and approved of, and a by-law will probably

be prepared at once and submitted to the ratepayers at the January elections. The cost as first estimated was placed at \$543,000, but alterations have been decided on by the Drainage Committee which it is thought will reduce the cost to about \$395,000.

TORONTO, ONT.—At the annual meeting of the Board of Management of the House of Industry held last week, the necessity of the erection of a wing to accommodate the aged poor was pointed out by Mr. Beverley Jones, who thought some action in the matter should be taken at once.—Mr. James Mansergh, C. E., the English waterworks expert, engaged by the city to report on the best means of improving the city's water supply, has arrived in the city and will commence his duties this week.—The Property Committee of the City Council have rejected the proposal to put an iron roof on the city hall, at a cost of about \$50,000, and Mr. E. J. Lennox, the architect, has been instructed to report on the probable cost of asbestos lining under the tile roof.—Mr. G. W. Gouinlock, is receiving tenders on a large storage barn and stables for the Steele Briggs Seed Co., to be built on Queen st. east.—Mr. W. G. Shaw has had plans prepared for a new residence which he proposes to build on his property on the Kingston road.—The Welland Vale Bicycle Co., of St. Catharines, have applied to the Property Committee for a lease of a lot on Front street, just west of York street, for the purpose of establishing a bicycle factory.—Tenders are invited until the 9th inst., addressed to the City Engineer for the supply of 1,000 tons of large egg coal and 5,000 tons of soft coal.—The City Council have passed a resolution to send a committee to Ottawa to assist the James Bay Railway Co. in securing an extension of time in which to complete their railway from North Bay to Lake Temiscamingue.—A company about to engage in the manufacture of butter for export, intends to erect a factory as soon as a suitable site has been chosen. Mr. Joseph Wright, of the Bennett & Wright Co., is the President of the company.—The building permits granted up to the 31st of October of this year amounted to \$1,286,570, as compared with \$929,710 for the corresponding period last year, an increase in favor of 1895 of \$356,800.—Mr. Chas. J. Gibson, architect, reports having received several commissions recently for churches and other building to be erected in various towns throughout the country.—Building permits have been granted as follows: Geo. Hill, four 2 story bk. fronted dwellings, 316 to 328½ Carlton street, cost \$2,500; E. C. Walker, 536 Queen st. w., seven attached 2 story bk. dwellings, 95 Woolsley st., cost \$5,500; Metallic Roofing Co., 2 story bk. factory, n. e. cor. King and Dufferin sts., cost \$7,000; Verral Transfer Co., bk. stables, s. side Front st. w., cost \$7,000.

FIRES.

The residence of Mrs. Robt. Kavanagh, about three miles south of Athens, Ont., was completely destroyed by fire recently. Loss, \$3,000.—The mill of P. T. Barry, at Fletcher, Ont., was burned last week.—The sand sheds of John Bertram & Son's tool works at Dundas, Ont., were damaged by fire on Friday last. Loss \$2,000, covered by insurance.—Simpson's saw mill at Coatsworth, Ont., was damaged by fire recently.—The brick residence of W. G. Egar, about half a mile west of Deseronto, Ont., was burned last week. Loss about \$6,000; insurance \$1,500.—One side of the main street of the village of Lancaster, Ont., was almost totally destroyed by fire on the 3rd inst., the loss being placed at \$40,000, with insurance covering about \$10,000. Among the losers are: D. P. J. Tobin, brick block; Mrs. A. Tobin, Grand Trunk hotel; Estate of John Fraser, three story building; Wm. Hen-

derson, block of stores; R. J. McDougal, storehouse on Terrace street.—The pottery works at Owen Sound, Ont., owned by John Lemon, were badly damaged by fire recently. Loss covered by insurance. The residence of Wm. Robinson, C. E., near the same town, was destroyed by fire on the 4th inst. Fully insured.

CONTRACTS AWARDED.

GLENCOE, ONT.—The contract for the new skating and curling rink has been let to Andrew Clanahan, at \$1,295.

CARLETON PLACE, ONT.—It is stated that the contract for the new town hall has been let to M. Ryan, of Smith's Falls, whose tender was \$23,000.

SUNDRIDGE, ONT.—The contract for the stone work for the new woolen mill has been awarded to John Buchanan. The mill will be 40 x 80 feet.

ST. JOHN, N. B.—Mooney & Sons have been awarded the contract for the masonry and E. Bates for the carpentry work of the new building for Manchester, Robinson & Allison. Contract price, \$4,169.

HALIFAX, N. S.—The contract for trenching the streets for the new gas company has been let to Donald Sutherland, contractor, and five miles of trenching will be done this fall. The contract involves an expenditure of \$200,000.

QUEBEC, QUE.—The following tenders are recommended for acceptance by the City Council for extras on the new City Hall: for Mayor's chair in black walnut, P. Valliere, \$480; recorder's chair in antique oak, J. B. Gingras, \$575; counters, per running foot, J. B. Gingras \$5.50; cupboards, The Globe Specialty Company, \$1,950; electric wiring, Montmorency Electric Company, \$2,500.

LONDON, ONT.—The contract for the stonework on the new London and Port Stanley railway bridge over Zavity pond has been awarded to Wm. Gibson, M. P., of Beamsville. The iron superstructure will be erected by the Hamilton Bridge Co.—Contracts have been let as follows for an addition to the Dominion Oatmeal mills on Talbot street: masonry, Everett & Sing; carpentry, John Purdom; painting, Russell & Wood. The work will cost about \$4,000.

MONTREAL, QUE.—The contract for the South Western railway between Beauharnois and Caughnawaga has been given out, at a cost of about \$120,000. The distance is 13 miles and the company will furnish the rails and build the station houses. 80 lb. rails will be used. The bridge across the Chateauguay river, which is to have stone piers and iron superstructure, will be 450 feet in length and will be of considerable importance.—Reid & Daly, local contractors, have the contract for building the Montreal Park and Island Railway Co.'s line to Cartierville, a distance of 6½ miles, and grading is now in progress.—Brown & McVicar, architects, have closed contracts for the Homeopathic hospital as follows: masonry, Wighton & Morrison; brick work, Amos Cowen; carpenter and joiner's work, Simpson & Peel, other trades not let.—Eric Mann, architect, has awarded the contracts for a warehouse, corner Victoria square and St. James street, for Alex. Macdonald, as follows: masonry, Heggie & Stewart; bricklaying, A. E. Wand; brick, supplied by Laprairie Pressed Brick Co.; carpenter and joiner's work, Robt. Neville; roofing, E. Bernier; plumbing and heating, D. A. McCrae; plastering, Kanott & Gardner; painting, Poirier & Archand.—Arthur J. Cooke has awarded the contract for alterations and additions to premises No. 54 Prince Arthur st., for J. B. Clearihue to J. E. Mooney & Co., general contractor.

The assignment of R. T. Robinson, contractor, Chesley, is announced.

BUSINESS NOTES.

Gray & Co., hardware, Orangeville, Ont., are said to be offering to compromise.

W. B. Malcolm, manufacturer of plumber's goods, Toronto, has assigned to W. J. Cameron.

The John Ritchie Plumbing and Heating Co., of Toronto, is applying for incorporation.

Geo. Yon, plumber, Montreal, has admitted Samuel Rosseau as a partner. The new firm will be Geo. Yon & Co.

John E. Matthews and Louis M. Lymburner have formed a partnership as brass founders in Montreal, under the style of Lymburner & Matthews.

The firm of Carver & Follet, contracting carpenters, Kingston, Ont., have dissolved partnership, and the business will be continued by John Caiver.


At a meeting of the shareholders of the Chanteloup Manufacturing Co., Ltd., held recently, it was decided to apply for an increase of capital stock to \$200,000.

J. C. King has sold out all his interest to D. W. Ross and Robert Reford. Mr. Ross takes the place of Mr. King on the directorate as vice president of the company.

WIND PRESSURE ON BUILDINGS.

A number of instructive experiments on the effects of wind pressure upon buildings and other structures have been made by Professor Kernot, and communicated by him in a paper read lately before the Australasian Association for the Advancement of Science. Wind for the experiments was obtained from a fan of special design that gave a practically uniform pressure over a considerable area. The effect of vertical walls on the pressure exerted by wind upon the roofs surmounting them was plainly indicated. A roof slanting 60 degrees experienced a reduction of

(Continued on page 4)



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two-fifths in the pressure it sustained when a vertical wall exposed to the same air current was below it. A roof slanting 45 degrees lost four-fifths, and one slanting 30 degrees showed no pressure. The cause of this is that when the side of a house is struck by a current of air traveling at right angles to its surface, the motion is turned into an upward one, and the air slides off the wall in a vertical direction with such force that it wholly or partly takes with it the upper horizontal current that would otherwise strike the roof. A parapet still further protects the roof from the effects of wind, carrying the oncoming air higher still.

QUARRYING WITH FINE CHISELS.

At Bangalore, in southern India, the quarrying of granite slabs by means of wood fire has been brought to such perfection that an account of the method is interesting. The rock forms solid masses uninterrupted by cracks for several hundreds of feet, and when quarried over an area is treated as follows: A narrow line of wood fire, perhaps seven feet long, is gradually elongated, and at the same time moved forward over the tolerably even surface solid rock. The line of the general splitting of the rock, light wood, which have been left burning in their position until strokes with a hammer indicate that the rock in front of the fire has become detached from the main mass underneath. The burning wood is then pushed forward a few inches, and left until the hammer again indicates that the slit has extended.

Thus the fire is moved on, and at the same time the length of the line of fire is increased and made to be convex on the side of the fresh rock, the maximum length of the arc amounting to about twenty-five feet. It is only on this advancing line of fire that any heating takes place, the portion which has been traversed being left to itself. This latter portion is covered with the ashes left by the wood, and with thin splinters which have been burst off. These splinters are only of about one-eighth of an inch in thickness and a few inches across. They are quite independent of the general splitting of the rock, which is all the time going on at a depth of about five inches from the surface. The burning lasts eight hours, and the line of fire advances at the average rate of nearly six feet an hour. The area actually passed over by the line of fire is 460 square feet, but as the crack extends about three feet on either side beyond the fire, the area of the entire slab which is set free measures about 740 sq. feet. All this is done with, may be, about 15 cwt. of wood. Taking the average thickness of the stone at five inches, and its specific gravity at 2.62, the result is 30 pounds of stone quarried with one pound of wood.

Mr. Archibald Blue, director of the Ontario bureau of mines, during his recent trip through the northwestern portion of the province, became interested in the

question of using trap rock as a material for roadways. The city of Cleveland has been using this material in the construction of about two miles of roadbed, and it has been ascertained from the authorities there that the foundation of the road is of limest one, ten inches thick, above which the trap rock is laid to a depth of eight inches, having first been crushed into screenings and dust. The roadbed cost per square yard, \$3.10, \$3.19 and \$3.65, according to the grade of work.

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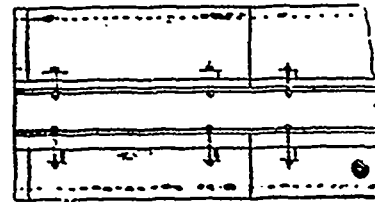
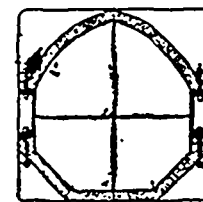
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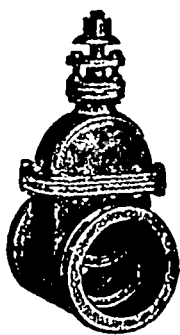


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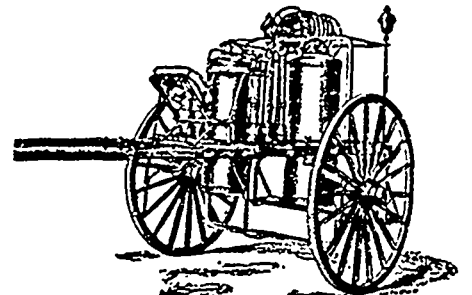
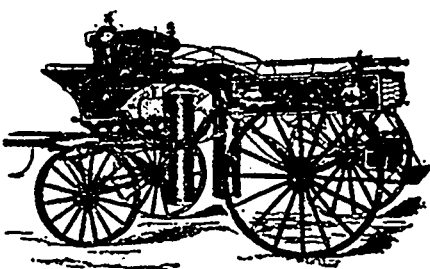
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MUNICIPAL DEPARTMENT

HYDRAULIC POWER SUPPLY FOR DRAINAGE.

Hydraulic power mains have recently been put down in the streets of Buenos Ayres for the purpose of drainage, and although the supply is not intended to be sold to the public, yet the conditions are such as to render interesting a general outline of the undertaking as an instance of a hydraulic power supply in towns. As engineer-in-chief of the works, the Hon. R. C. Parsons had a few years ago to face the problem of draining the two low-lying Boca and Barracas districts. In order to avoid the great cost and difficulty of laying deep sewers, he ultimately decided to lay out the works on the plan of numerous small automatic pumping stations, and finally adopted hydraulic power as the best means for working the pumps at the sumps. There is a central station, containing two compound surface-condensing horizontal engines, having cylinders 15½ in. and 27 in. diameter with 22 in. stroke; each engine works direct a double-acting pump of 5 in. diameter and 20 in. stroke, and is capable of delivering 175 gallons of water per minute at 58 revolutions. Space has been provided for a third engine, whenever the work to be done at the sumps renders it necessary. There are three Lancashire boilers, 6 ft. diameter by 22 ft. long, with a Green's economiser of 120 tubes. The roof of the engine-house is a tank, which is kept supplied from the water works mains. The water after use is run to waste into the sewers. The engines can be run with or without the condensers, as it is sometimes inconvenient to use the water in the tank for condensing purposes, owing to the high temperatures during the hot season. There are two accumulators of 18 in. diameter and 20 ft. stroke, which were loaded at the trials to 800 lb. per square inch; but the machinery is calculated to work at 750 lb. per square inch, under ordinary conditions. The station is fitted out with the usual accessories. The mains carried through the Boca and Barracas districts are nearly 8½ miles in length. There is a duplicate supply to every sump. The largest mains are 5 in. bore, and the smallest 2 in. bore. There are in all 17 sumps. Each sump contains duplicate hydraulic sewage pumps on the author's system. The quantity of sewage to be dealt with varies considerably at the different sumps, but it was found practicable to reduce the whole of the pumps to two sizes, and as a matter of convenience the only substantial difference between them was made in the stroke. They are all single-acting, and have plungers 30 in. diameter; 22 of them are made with 3 ft. stroke, and 12 with 4 ft. stroke; the maximum speed of working is 10 double strokes per minute. The head of water and friction on the delivery

sewers are also different at the different sumps, and the diameter of the hydraulic working rams was varied to suit. The pressure on the side rams, which perform the up stroke, is constant; the water from these rams is returned in the down stroke to the central hydraulic cylinder. The sewage runs into the sumps by gravity, and when they are nearly full a float starts one of the pumps, and when the level falls a certain amount the float stops the pumps. If the level of sewage continues to rise after the first pump is at work, another float starts the second pump. The pumps therefore always work so as to cause a flushing velocity in the rising main or sewers. The exhaust power water is discharged into the sewage-pump cylinders, thus serving to dilute the sewage and keep the plungers clean. The whole arrangement is automatic. At the time the machinery was completed, there were no houses connected to the sewers, so that the tests had to be made with water run into the sewers for the purpose; the results of the engine tests are given in Table IV. The delivery sewers discharge at different points into the main outfall sewer, which is everywhere above the level of the Boca and Barracas drainage area. The whole of the mains were tested to 1,500 lbs. on the square inch after being laid. In laying them during the hot weather it was found necessary to protect them from the heat of the sun, in order to preserve their correct length. The whole of the work, including all the mains, was prepared in such a way that it was unnecessary to obtain making-up pieces in Buenos Ayres, and all the machinery for each sump was erected in the workshops at Chester before being sent out.

TABLE IV.—Hydraulic Power Supply for Drainage in Buenos Ayres.—Trials of Two Compound Horizontal Condensing Pumping Engines at Central Station.

November 21, 22, 1893.	Engine No. 1.	Engine No. 2.
Duration of trial, hours	10	11
Diameter of high-pressure cylinder	15½ in.	15½ in.
Diameter of low pressure cylinder	27 in.	27 in.
Stroke	22 in.	22 in.
Revolutions, total during trial	35,150	35,030
Revolutions, average per minute	55.28	48.38
Indicated horse-power, mean	119.131	120.757
Water pumped at 600 lbs. pressure per sq. inch, total during trial, gallons	106,493	105,931
Water average per minute, gallons	177.15	17.15
South Wales coal feed into furnaces, total during trial, ash, etc., not deducted, pounds	2,354.51	2,192.47
Coal per indicated horse-power per hour, pounds	1.97	1.81
Coal per pump horse-power per hour, pounds	2.37	2.22
Boiler pressure per sq. inch above atm., pounds	100	100

It will be seen from Table IV that the coal per indicated horse-power was 1.89 lbs. per hour, and per pump horse-power 2.29 lbs. per hour. Taking the average efficiency at the sewage pumps at 50 per cent.,* including all losses in the mains and valves at the highest speed contemplated, the expenditure of coal is 4.58 lbs. per pump horse-power at the sumps. This shows that 41 per cent. of the indicated horse power of the engines is recovered in useful work at the sumps. The pumps have to work under most variable conditions, and are situated at 17 sumps

*The actual efficiency of the pumps with the higher lifts of 20 ft. to 28 ft. was considerably more; but at the lower ends of 10 ft. to 15 ft. the efficiency was necessarily reduced.

distributed over an area of nearly two square miles, requiring over eight miles of mains to connect them with the central station. The economy to be attained under such circumstances cannot be great, and it is believed that no other method of distribution has shown such good results under similar conditions. The Hydraulic Engineering Company, Chester, were the contractors for the construction and erection of the whole of the plant; Mr. F. W. Thornton had charge of the erection of the machinery and laying of the mains for them. Hydraulic pumps of the same kind as those at Buenos Ayres have been for some years at work, pumping the water from the River Thames into the reservoir tanks at the London Hydraulic Supply stations. At Falcon Wharf, Blackfriars, the head is about 80 ft., including friction in the rising main; and the efficiency of the pumps is 75½ per cent.

CANVAS COFFERDAM.

AN interesting illustration of the usefulness of canvas in engineering operations is related in connection with the construction of Queen's bridge in Melbourne. It became necessary to build four piers, each consisting of eight cylinders, and these piers had to be founded on the bottom of a channel formed by blasting, and as the bottom was littered with large pieces of rock and was uneven and shattered, it was finally decided to resort to a square dam around each cylinder, and in order to make such dams available for more than a single cylinder, the whole of one side was fitted so as to open outward like a door—thus, after the cylinder was firmly settled in place, the door would be opened and the dam removed for use at another point.

Such a device had to be as light as possible so as to be readily moved, and it was accordingly made of a single thickness of sheathing covered with tarpaulin; the sheathing was vertical, and consisted of 12 x 4-inch rough-sawn planks, and was held against a series of horizontal frames by means of horizontal pieces on the outside of the planks, the tarpaulin commencing at the corner where the door closed and passing completely around the outside of the dam. Before beginning work all the sheathing was arranged with the bottom ends flush with the bottom horizontal frame; it was placed over the site of a cylinder and loaded until it sank as far as possible, after which the sheathing was driven by a pile driver to the rock through puddled clay, which had been thrown on the site, the vertical sheathing being next drawn up by jackscrews, one plank at a time, until the chisel marks came back to their original position, when the door was opened and the dam removed to another site.

A SUIT has been commenced by Jas. [Name], of Port Stanley, against the lessees of the London and Port Stanley gravel road, to test their right to collect tolls. At the instance of the lessees the County of Elgin has been made a third party to the suit.

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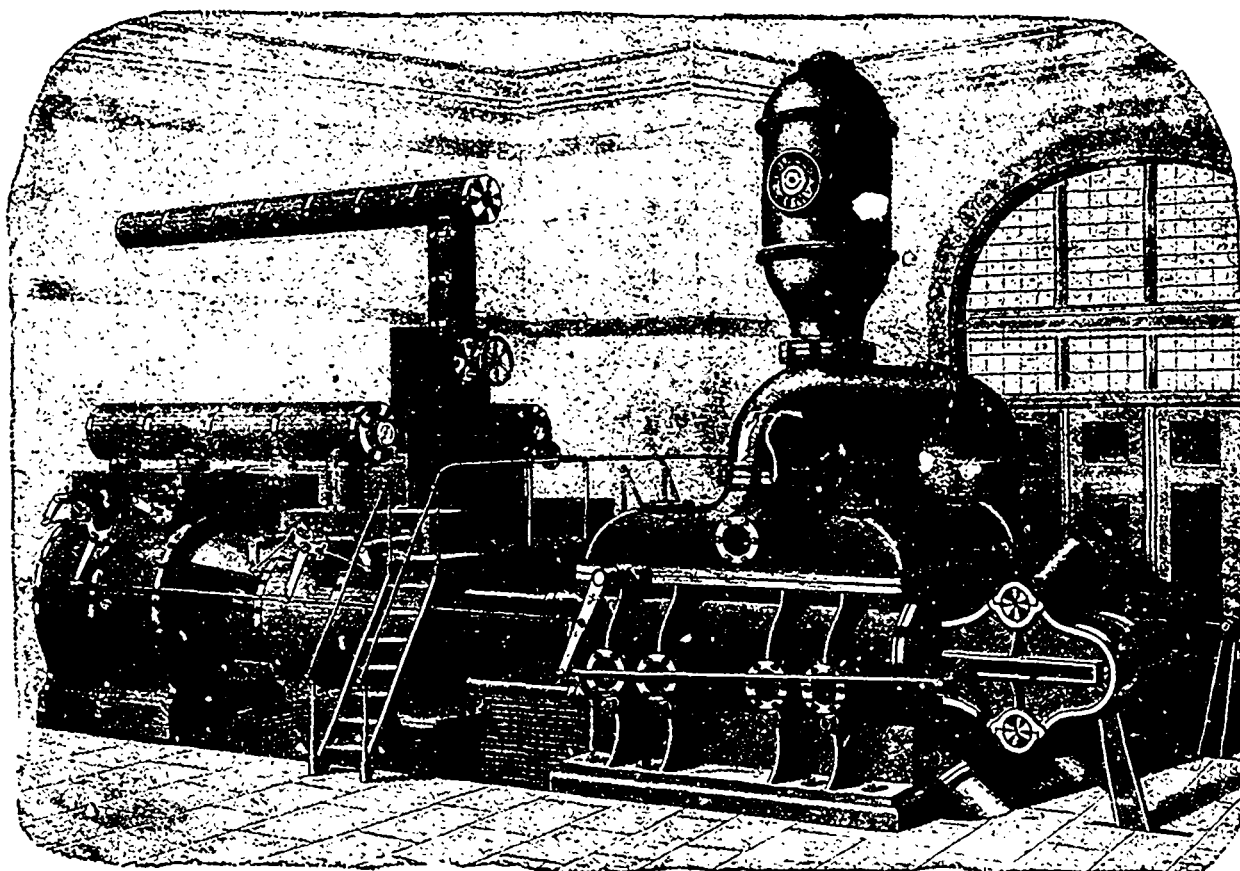
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Table listing prices for sand per load of 1 1/2 cubic yards.

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Table listing prices for slating nails in different sizes.

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Table listing prices for common barrel nails in various sizes.

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