

it has been found necessary only to direct the spray against the walls in the combustion chamber, and the piston, the rest of the cylinder being kept cool by conduction. Cold water is injected through a hollow casting projecting into the combustion chamber and provided with a number of nozzles or holes about  $1/32$  in. in diameter, from which the jets are projected against the metal surfaces.

For the purpose of experiment, an  $11\frac{1}{2} \times 21$ -in. Crossley engine, rated at 40 h.p., was fitted with a new cylinder consisting of a plain barrel without a water jacket. The injection rose is a hollow casting projecting into the combustion chamber and provided with 25 holes. The drip from the rose suffices to cool the exhaust valve. A simple plunger pump driven by a cam injects a charge of water once in a cycle, lasting from about 30 deg. before to 30 deg. after the point of the sliding surface of the barrel is covered by the piston. The quantity of water used was about 2.4 lb. per brake horse-power-hour, and the temperature of the engine ranged from 150 to 180 deg. C. The engine consumed about 15 cu. ft. of coal gas per brake horse-power-hour, both when it was water-jacketed and after being fitted with the new cylinder.

Tests at other loads showed that with a weak mixture the gas consumption is slightly increased by the water injection, but with very rich mixtures it is a trifle less. The difference, however, does not exceed 5 per cent. either way, and on the average it may be said that the economy is unaffected by the use of this method of cooling.

This engine was set to work driving a dynamo, and its speed was increased from 180 to 195 r.p.m., when it was found capable of developing 50 b.h.p. for many hours, an increase of 25 per cent. on its original maximum safe load. It has now been running for a total period of 5,000 hours on regular work, giving no trouble at all, and the combined wear on both cylinder and piston is less than 0.01 in.

To regulate the water supply in accordance with the load the pump is connected to the governor, which is of the hit-and-miss type, so that the pump only takes a stroke when the engine takes gas.

With a throttle governor a corresponding regulation is easily provided. A simple thermostat has also been devised, which automatically controls the supply of water during starting, and when the engine is running, quite satisfactorily.

In case of failure of the water supply, nothing happens except that the engine slowly heats up, and after ten minutes or so, pre-ignitions occur, bringing the engine to a standstill. No damage results from this, but to guard against any possible danger a fusible safety plug is screwed into the combustion chamber, which melts if the cylinder gets too hot, and the noise of the escaping gases warns the attendant.

The system has also been applied to an engine of 105 h.p., and to one of 1,000 h.p.; in each case the original cylinder was used, without water in the jacket. The large engine was run under load 30 hours without a stop; after a short stop for adjustments, it ran for 70 hours without a stop, driving a factory, and developing an average of 800 h.p. The whole of the injection apparatus for the 1,000-h.p. engine cost only \$100, and within a few hours of putting it on the engine it was doing all the work of the cooling tower, centrifugal pumps, etc., previously used. An 18 x 24-in. two-stroke-cycle single-acting engine has been built for use with the new system, and is now undergoing trials.

## COAST TO COAST.

**Calgary, Alta.**—The G.T.P. is erecting a temporary station, pending the conclusion of negotiations for permanent terminals.

**St. John, N.B.**—Two of the longest branches of the branch railways projected are now in operation, while the other three are in process of construction.

**Toronto, Ont.**—The date of the completion of the Dominion Government's harbor contracts has been set at four years hence.

**Victoria, B.C.**—The Daily Times contains an editorial calling attention to the uncertain suspension in the plans for the terminals on the reserve and magnificent bridge that was to span the harbor from Johnson Street. The government announced this construction about a year ago.

**Vancouver, B.C.**—Eighty miles of double track have been completed from Vancouver west to Ruby Creek, and have been inspected by the Railway Commission Engineer. Formal approval for the operation of the second track is expected shortly.

**Toronto, Ont.**—It will be requested before the Ontario Railway Board that the Toronto Railway Company be compelled to extend their line west along Bloor Street from Dundas Street to Quebec Avenue, instead of constructing the projected Toronto suburban line along Annette Street and Pacific Avenue.

**Ottawa, Ont.**—The question of pollution of navigable streams and their tributaries, upon which a special committee of the House of Commons heard last season a great deal of evidence and gave a report, will likely furnish food for a conference between the provincial and federal authorities this autumn. The report recommended the calling of an interprovincial conference, and it is understood that all provincial governments will be called upon to send delegates to a gathering of experts to be held in Ottawa in November.

**Winnipeg, Man.**—Mr. George Bury, vice-president of the C.P.R., has stated that the program mapped out by the company for 1913 will be completed to the last detail, and that all the grading and steel work planned to be done will be finished this year. Concerning the double tracking, he said that more of it would be in operation before the close of the year.

**Edmonton, Alta.**—It was stated by Sir William Mackenzie on his return trip from inspecting the western progress of the C.N.R., that construction was now 74 miles beyond the British Columbia border, and that the company hoped to have the road to the coast completed by the end of 1914. He added that 300 miles of branch lines have been laid through the prairie provinces this year, and that, taken in all, the C.N.R. has laid 840 miles of new track since the beginning of the year.

**Toronto, Ont.**—Hydro power has enabled the farmer of Western Ontario to chop ensilage, thresh grain, and stock his barns by electrical energy. This revolution of the system which handles the annual harvest will, according to present indications, branch out beyond Ontario boundaries. Negotiations are now under way, it is understood, between Detroit and Windsor for the sale of power to the American city for like industrial purposes. The Hon. Adam Beck has stated that, though this is the first instance where power has been sought in this way, all municipalities agree that such disposal of power could be arranged under certain restrictions. A town could sell of its surplus to the extent of 7,500 horse-