

residual material would give trouble in the engine. In general the boiling point or distilling proportion is of more importance.

**Calorific Value.**—The heating value should be not less than 9,000 calories, and the hydrogen content not less than 10 per cent., as lower values are approaching the value of pure carbon and will give poor combustion.

**Sulphur Content.**—The sulphur content should be not more than 0.75 per cent., as a greater proportion may attack the cylinder walls and will tend to pit them, making them rough. Brass, zinc, and copper are to be avoided in the surfaces exposed to combustion. Nickel steel seems to be the most resistant material.

**Acid and Alkaline Content.**—The oil should contain no free ammonia, alkalis, or mineral acids, because of their pitting effect on the surfaces exposed to combustion.

**Ash Content.**—The oil should contain not more than 0.05 per cent. of non-combustible mineral matter, because such matter tends to hasten carbonization within the cylinders and to prevent proper combustion.

**Water Content.**—The water content should be not greater than 1 per cent. One per cent. of water reduces the calorific value by 1 per cent. Moreover, to raise the temperature of 1 gram of water from room temperature, say 30°, to 100° C. requires 70 calories, and to evaporate 1 gram of water at 100° C. into steam at 100° C. requires 536 calories. Hence 1 gram of water causes a total reduction of 536 + 70, or 606 calories, and to raise the temperature of the steam to that of the cylinder requires still more heat. The absorption of heat in raising the temperature of the steam is partly compensated by the action of the steam in expanding and performing work on the piston, there being an abundance of heat in the cylinders. In short, 1 per cent. of water in the fuel itself will cause a loss of approximately 1.06 per cent. in the calorific value of the fuel. It must also be remembered that a drop of water suddenly generated into steam within the fuel spray at the instant of ignition may lower its temperature and thereby prevent ignition, and a number of such drops in succession might stop the engine.

**Resin Content.**—The resin content should be low, as resins have a tendency to carbonize readily and will tend to coke in the cylinders.

**Creosote Content.**—Oils containing creosotes up to 12 per cent., though causing smoke to some extent, can be burned; a higher percentage of creosote gives trouble by coking.

**Paraffin Content.**—A paraffin content of 15 per cent. will give some trouble. An oil containing a still higher percentage of paraffin, because of the large quantity of oxygen necessary for complete combustion, will burn with more difficulty.

**Asphaltum Content.**—The heavy-oil engine, at least so far as the use of asphaltum oils is concerned, is still in its experimental stage, but the assumption can fairly be made that when the mechanical difficulties are surmounted it will be practicable to burn any fuel oil containing asphaltum that is sufficiently fluid to flow, providing the oil be free from solid matter and water. An oil containing 21 per cent. asphaltum has been successfully burned.

**Atomization.**—Fine atomization is essential, for if the fuel enters the cylinder in drops of appreciable size, which can burn only from their surfaces, it will not have time for complete combustion. The fuel will consequently strike the sides of the cylinders and the piston head and there carbonize.

## COAST TO COAST.

**Ottawa, Ont.**—The report of the Conservation Commission on the Long Sault power development scheme will shortly be ready for submission to the Government. It will declare emphatically against such an undertaking being turned over to any company, and that if the power is harnessed it should be done by the Government. The engineers have found the scheme quite feasible from their standpoint, but there would be danger to navigation as well as risk of flooding adjacent territory. The immense value of the power as a natural resource will be emphasized, together with a declaration that its export from the country should not be permitted. The report is now being revised by Hon. Clifford Sifton, chairman of the Commission.

**Ottawa, Ont.**—If Canada becomes a base of supply for oil fuel for the British Admiralty in furtherance of its scheme for operating warships by that method, the sands of the Athabaska River will be the principal source, is the opinion of Mr. James Whyte, deputy head of the Conservation Commission. "If the tar sands of the Athabaska mean anything," said Mr. Whyte recently, "it is that below them are quantities of petroleum. On three occasions wells have been sunk, but this was always done on a wrong principle. The boring was not of sufficient size. It is wholly probable that if the examinations were made under proper conditions the supply would be forthcoming in paying quantities. We are endeavoring to interest capitalists in the proper development of these deposits. The oil in the eastern wells is too valuable as an illuminant to be used for fuel."

**Montreal, Que.**—After careful consideration, the Harbor Commissioners have decided that the projected extensions to the Alexandra, King Edward and Jacques Cartier piers cannot be commenced this season. When the programme of works for this year was given out, it was announced that the Commissioners were desirous of extending each of these piers, but that they would await certain alterations which the Dominion Government intended to make at the entrance of the Lachine Canal before putting the work in hand. After the collision between the lake steamer "Calgary" and the "Levenpool," while the latter was lying at her berth at Shed 15, the Harbor Board reconsidered the question, as the danger to navigation in the harbor of the sterns of ships projecting beyond the piers at which they were berthed was obvious. Finally, the decision has been arrived at that the work cannot be undertaken, pending the alterations referred to above, as the congestion of traffic that would inevitably result would be too great.

**Victoria, B.C.**—Dr. G. A. B. Hall, medical health officer, and Mr. Birch, the city analyst, discussing Dr. Newnham-Davis, advocacy of the oxychloride process of treating sewerage, remarked that the use of salt water by its electric decomposition had been tried in the East with success. The isolation of chlorine by electrolysis results in the typical disagreeable odor, which would have to be cared for by rendering the gas soluble in water and using it over again. As a disinfectant the results in hospitals and surgeries are well known, and there is no reason why it should not succeed in sewerage treatment. At the present time in the north-west sewer scheme experiments are being made to determine the course of currents so as to ascertain whether the tide would bring back sewerage from McLoughlin Point to the Inner Harbor. If it is necessary to treat the sewerage, as is done in the oxychlorine process, two tanks would be necessary, and it is the intention of the health department to secure some more information on the subject.

**Hull, Que.**—At a special meeting of the Hull city council, held recently, a motion was passed approving of the Federal