about 7½ feet per mile, the ditch being 5 feet wide at the bottom with 1½ to 1 side slopes, and calculated to run slightly less than 3 feet per second, and to carry 60 c.f.s. with a depth of 2½ feet of water. At rock excavations where steeper slopes occur, the width is 7 feet across the bottom, and at sharp bends compensation in width is allowed for.

The flumes consist of continuous wood staves set up similarly to a continuous wood stave pipe. This design

Inlet to Flume and Waste Gate.

occurred to the writer about 13 years ago, and only after very careful investigation was it adopted for this ditch. The flume is grooved and tongued, dressed to curve or radius and treated with carbolineum before erection. The rods are ⅜-inch diameter and the nuts 50 per cent. longer than the standard size to avoid stripping in tightening up especially under the strain in rounding curves. The ties across the top are of 3-in. x 4-in., set flat and one foot centre to centre. The flume is supported by wooden yokes cut to fit the flume out of 3-in. x 12-in. fir, and set to 6-foot centres. The ties and yokes were dipped in liquid asphalt.

The total length of the flume erected is 8,689 lin. ft. The diameter is 5½ feet; the weight per mile is 199 tons; the staves are 1⅝ inches thick and cut out of 2-in. x 6-in. fir. Turning curves of less than 200 feet radius was found to be difficult, and staves of less width are recommended. The continuous wood-stave flume gives even curvature, very much facilitating the flow of water. The flume was tested to a depth of 2 feet of water with very satisfactory results.

The ends of the flumes are set in concrete structures or headwalls where expansion and contraction is provided for by caulking the joint between the flume and the concrete with tarred unravelled rope or oakum.

At convenient places along the line of the ditch waste gates are provided for use in the event of a washout or accident, and these were usually placed at the entrance to flumes and sometimes in the bank of the ditch. The waste water is led away through a wooden flume to the nearest creek or gully.

At 8 miles from the headgate is Eight Mile Creek, across which the water is carried by an inverted siphon. This is a 27-inch inside diameter riveted steel pipe 1,220 feet long, with a maximum dynamic head of 200 feet, the thickness of the plate being No. 9 I.S.G., or 0.144 inches. The joints are of the Matheson type and leaded.

The grades are generally very steep (in one place 40°) and heavy anchorages of concrete with holding-down rods and shape steel were placed at each bend. The inlets and outlets are concrete tanks provided with gratings and flushing gates.

The difference in elevation between the inlet and outlet is 60 feet.

At 10½ miles below the intake a throwaway is built to keep the ditch clear of a rock slide on Black Mountain and to reduce the unnecessary elevation at this location. The throwaway is 2,000 feet long and drops 300 feet to a tank where part of the water continues northwards through a siphon across a gully to the continuation of the main ditch, that will eventually irrigate to the northern boundary of the company's property in a distance of 7 miles. The balance of the water goes through a siphon 8,879 feet long of various diameters proportional to the water conveyed, the diameters being 18, 14, 12 and 10 inches. The difference in elevation between the inlet and the outlet is 230 feet with a maximum dynamic head of 450 feet. This siphon, as well as Eight Mile Creek siphon, was tested to the full static head.

The pipe is lap-welded steel, made by Stewarts and Lloyds, with leaded joints for pressures up to 350 feet head, and with Drees bolted expansion joints for pressures over 350 feet.

The 18-inch pipe is 6 mm. thick, and the rest of the pipe 5 mm. thick.

This siphon will deliver water to a large area of land on Hepburn Hill. The main delivery from this siphon is from the low point to irrigate about 1,000 acres. In this siphon, as in Eight Mile Creek siphon, concrete anchorages were placed at the bends on the steeper ground.

The laterals are of various types and have still to be built; these will be in concrete where imbedded in the ground. Semi-circular flumes are of wood or galvanized iron or steel where trestle work is necessary, and the siphons are of continuous wood-stave pipe.

A NEW ENGINEERING FOUNDATION.

The United Engineering Society of New York has inaugurated "The Engineering Foundation," a fund to be devoted "to the advancement of engineering arts and sciences in all their branches." Eleven members constitute the Board, nine from the American Society of Civil Engineers, the American Society of Mechanical Engineers, the American Institute of Electrical Engineers, and the American Institute of Mining Engineers; the other two are chosen at large.

An inaugural meeting was held last January in New York, The principal speakers were: Mr. Gano Dunn, President of the United Engineering Society, Past-President of the American Institute of Electrical Engineers; Dr. Henry S. Pritchett, President of the Foundation for the Advancement of Teaching; Dr. Robert W. Hunt, Past-President of the American Institute of Mining Engineers; Dr. Alexander C. Humphreys, Past-President of the American Society of Mechanical Engineers. Standard Designs for Concrete Highway Bridges and Culverts.—C. B. McCullough, Designing Engineer, Iowa State Highway Commission, Ames, Ia. Report of Committee on Standard Specifications for Concrete Highway Bridges and Culverts.—Willis Whited, Chairman.

The growth in the rolling stock of Canada's leading railroads during recent years is shown in the following table:—

	Locomotives.	Freight Cars.	Passenger Cars.
1907	3,504	107,407	3,642
1908	3,872	115,709	4,026
1909	3,969	117,779	4,192
1910	4,079	119,713	4,320
1911	4,219	127,158	4,513
1912	4,484	140,918	4,946
1913	5,119	182,221	5,696