8 ft. deep and 26,200 ft. long. The fall is 5 inches per mile. The aqueduct ends at a settling basin of a capacity of 1,064,885 cubic feet, used for the distribution of the motive power to the hydraulic engines and for the drawing of the water supplying the city.

At the mouth of the aqueduct a pier about 1,000 feet long has been built for the purpose of slackening the water and current of the river. Sluice-gates, situated at the mouth, and two dams with movable gates, situated in the canal, regularize the level thereof; eighteen bridges cross the canal and afford the means of circulating on the roads which connect the several portions of the river-side properties.

Low Level Pumping Station.—The water is raised by means of two systems; by hydraulic machines to the extent of about 60 per cent. of the consumption, and by steam engines for the balance. The system comprises four sets of pumps, viz.: No. 1—A Jonval turbine, with two double-acting pumps, which can pump 4,000,000 gallons per 24 hours. No. 2—A Samson horizontal double wheel, with two double-acting pumps and an air reservoir, capacity 5,000,000 gallons per 24 hours. No. 3—A Jonval turbine, with three double-acting pumps and two air reservoirs, capacity 3,000,000 gallons per 24 hours. No. 4—A Jonval turbine, with two double-acting pumps and an air reservoir; capacity, 3,000,000 gallons per 24 hours. The overflow of the settling basin and the water operating the hydraulic machines fall into a waste weir, below the building, and after a course of about 3,500 feet, flow into the St. Lawrence river, opposite the down stream point of the Nuns' Island.

The second building contains the steam-engines, the system of which comprises three sets of pumps, viz.: No. 1—A high duty Worthington engine of a capacity of 10,000,000 gallons per 24 hours. No. 2—A high duty Worthington engine of a capacity of 10,000,000 gallons per 24 hours. No. 3—A high duty Worthington engine (duplex) of a capacity of 8,000,000 gallons per 24 hours.

The third building contains the steam generators, which are composed of two sets of three Heine boilers, and a set of three Lancashire boilers.

From the pumping station the water is forced into the low level reservoir and into the services by two mains of 30-in. diameter, having together a length of 16,102 feet, and by two 24-in. mains having a total length of 27,709 feet. One of the 30-in. mains is still unfinished, and only branched upon the other of the same diameter, after their passage under the Lachine Canal.

Low Level Reservoir.—The pumps at the low level station raise the water up to the main reservoir of the city, situated at the angle of McTavish St. and Carleton Road, at the altitude of 204 feet above the river and 165 feet above the intake basin of the low level pumping station. The said reservoir, dug into the rock, has its bottom on the uneven bed of the quarry, and its perimeter walls are partly formed by the sides of the quarry, the rest of the walls being composed of undressed stone masonry pointed with cement. It is divided into two equal parts by a masonry wall of the same nature as the perimeter walls. The capacity is 37,000,000 gallons.

High Level Pumping Station.—A building erected on the land adjoining the above-mentioned reservoir contains the high level elevating machines which are composed of a system of two pumps operated by steam. 1. A high pressure Worthington pump (duplex), of 24 horse-power and of a capacity of one-half million gallons per 24 hours. This pump is almost unfit for use. 2. A high pressure Gilbert pump (compound system) of 250 horse-power and of a capacity of two and one-half million gallons per 24 hours. The steam is supplied by a sectional tubular boiler of the Caldwell high pressure type, 200 horse-power fed by two American mechanical stokers. Old boilers of the locomotive type of 120 horse-power each are still used during the cleaning, or when accidents take place to the Caldwell boiler. The pumps take the water in the low level reservoir and raise the same by a force main of 20-in. and 12-in. diameter, and 1,674 feet long, passing through McTavish St., Pine Ave., Mt. Royal Park, and ending at the high level reservoir situated on the slope of the mountain, opposite Peel St., at the altitude of 434 feet above the river and 230 feet above the low level reservoir.

High Level Reservoir.—This reservoir is built about in the same way as the low level reservoir, but has only one compartment. Its capacity is 1,750,000 gallons; it equilibrates the water supply and contains the reserve for the section of the city lying north of the limits above mentioned for the low pressure.

The district so supplied comprises all that part of the city lying north of the limits above mentioned for the low pressure.

The water mains make a total length of cast iron pipe of 1,119,274 feet, and vary in size from 1½-in. diameter to 30-in. The distribution is regulated by means of 3,082 valves of various diameters. These mains supply 1,772 public hydrants and 58 private ones. They are all laid underground, in cuts, with the exception of a portion of the 24-in. force-mains, which are contained in an underground gallery on a distance of about 120 feet. The water is distributed to the ordinary consumers by free cocks, and to manufacturers, etc., by meters.

BRITISH IRON AND STEEL INSTITUTE.

At the British Iron and Steel Institute meeting, held during the first week of September, at Barrow-in-Furness, England, R. A. Hadfield read a paper on the "Alloys of Iron and Tungsten." The author pointed out that the strength or density of iron in its hitherto purest form produced commercially (about 99.9 per cent. of iron) was 18½ to 20 tons per square inch. In cast-iron the density might go as low as about five tons to the square inch, and in steel might rise to considerably over 100 tons, or, in the form of wire, to over 200 tons per square inch. That would be an increase on its original strength of five to ten times respectively. In the same manner its ductility, usually known as "elongation," under static stress could be reduced from about 40 per cent. in its pure form to practically zero in cast iron. On the other hand, special steel alloys could be obtained of nearly double the ductility of even that of the originally pure form. The author had obtained by a nickel manganese addition to iron an alloy having the extraordinary elongation of 75 per cent. on an 8-in. specimen, whilst the tungsten was nearly 60 tons per square inch. Whilst iron was the most magnetic metal known, by the addition of manganese, as in the author's manganese steel, a substance was produced practically inert to magnetization, showing that equally wide ranges of change are met with in the electrical, magnetic, and other properties of the metal. After referring to the origin of the name and the discovery of the metal, the author gave a description of the sources of ores of tungsten. The ores had long been known to contain wolfram, the name given to the compounds or metallic form of the metal, it being found associated with tin ores. As tungsten appears to raise the melting-point of iron, alloys containing more than 40 per cent. of it are produced with difficulty.

The first practical application of tungsten on a comparatively large scale appeared to have been that some tungsten steel rails were manufactured in 1868 at Terre Noire. They contained about 0.5 per cent. of tungsten. The results obtained are not known. In the physical data given in the paper, it was stated that tungsten, like chromium, is as far as was known, not malleable. The purest forms which the author had been able to obtain possessed hardness and brittleness, and were not ductile either in the ordinary or heated condition. The atomic weight was given as 18.60, the specific gravity as 19.26 and the melting point of the metal 1,500 deg. C. For many years tungsten had been used in the production of what was known as self-hardening steel, the addition being made in the form of an oxide or by means of a metallic powder. Latterly the metal had been manufactured as a ferro alloy, a means which afforded greater regularity, the uncertainty of the production in past times