THE HISTORY AND STATISTICS OF AMERICAN WATER-WORKS.

BY J. JAMES R. CROES, M. AM. SOC. C. E.

(*Continued from page* 405.)

CCCCXV.—WHEELING.

Wheeling, West Virginia, in lat. 40° 8′ N., long. 80° 47′ W., on the east bank of the Ohio River, is on the bottom lands where Wheeling Creek empties into the river, and on Zanes Island in the river. It extends four miles along the river, and averages half a mile wide from the river to hills from 250 to 600 ft. high.

Settled in 1782, it was incorporated as a city in 1836. Water-works were built by the city in 1831, taking the supply from the Ohio River.

The suction pipes of the pumps are laid about 100 ft. into the river, and are perforated near the end with 1-in. holes. Two side-lever steam engines, with cylinders of 20-in. diameter and 84-in. stroke, are geared to double-acting piston pumps of 16-in. bore and 120-in. stroke, the engine making two strokes to one of the pump. In 1880 a Worthington duplex high-pressure engine of 29-in. steam and 15-in. water cylinders of 36-in. stroke was added.

The water is pumped 190 ft. into a reservoir on the hill side 150 ft. above the lowest part of the city, but 25 to 50 ft. below many residences on the hill. It is on rock, and inclosed by masonry walls. It holds 880,000 gallons. Every year from 18 to 24 in. of sediment is removed from its bottom.

Distribution is by cast-iron pipe of from 30 to 8 inches diameter. Many of the smaller pipes have become filled with sediment, and are being replaced by 6 inch pipe. It is estimated that 32½ miles of pipe are in use, with 300 fire hydrants. The number of gates and taps is unknown to anyone. Service pipes are of lead. There are no meters except 13 on hydraulic elevators, and they are not used.

The population in 1880 was 31,186. The daily consumption is estimated at 3,000,000 gallons. The cost of the works and the bonded debt are unknown. No systematic account of expenses was kept prior to 1882. The expenses and receipts for 1880 and 1881 were as follows:

	1880.	1881.
Pumping expenses	$9,310.39	$14,512.81
Salaries	5,000.00	5,000.00
	$14,310.39	$19,512.81
Extensions	12,177.23	54,567.15
Contingent Expenses	8,303.80	25,783.50
Total Expenses	$34,791.42	$99,863.46
Receipts	53,551.89	56,022.46

The works were formerly managed by a committee of the City Council. There is now a board of control of 3 members elected by the Council.

John Cummings was Superintendent from 1862 to 1878. James H. Riddle is the Superintendent now.

CCCCXVI.—STEUBENVILLE.

Steubenville, Ohio, in lat. 40° 25′ N., long. 80° 43′ W., is on high ground on the right bank of the Ohio River. Low-water mark in the river is 640⅓ ft. above the sea.

A block house was built at the point in 1876, but the town was not settled until 1797. It was incorporated as a city in 1851, and extended in 1871. The town was supplied with water from springs through wooden pipes prior to 1835, in which year water-works were built by the town, taking the supply from the river and pumping it by a 40 horse-power steam pump three-quarters of a mile, through 8-in. pipe, to a reservoir holding 400,000 gallons, 192 ft. above the river. Another reservoir, holding 600,000 gallons, was afterward built. In 1867, two steam engines, each of 150 horse-power, with plunger pumps, were built by James Means & Co., and a 20-in. force main laid. Two 15-in. pipes, laid 300 ft. out on the river bed, convey the water to the pump well. The supply is taken from the river below where the city drainage enters it.

Distribution is by 13.8 miles of cast-iron pipe, of from 20 to 2-in. diameter, with 109 fire hydrants, 192 gates and 1,725 taps. Service pipes are of lead.

The population in 1880, was 12,017. The daily consumption, in 1881, was 1,300,000 gallons.

The cost of the works is not known. The bonded debt is $12,000 at 5 per cent. The expenses in 1881 were $20,473.80 for maintenance, and the receipts from water rents were $16,750.

The works are managed by three trustees. R. J. Irwin is the superintendent.

CCCCXVII.—PERU, IND.

Peru, Indiana, in lat. 40° 47′ N. long. 86° 6′ W., is on the Wabash River, on level ground extending back about half a mile to bluffs 90 to 100 ft. high. It was settled about 1820. Water-works were built by the city in 1879, after plans of J. D. Cook, C. E., taking the supply from the river. A 20-in. cast-iron pipe conveys the water 370 ft. from a crib in the river to two brick wells 5 ft. in diameter and 22 ft. deep, from which it is pumped by a Worthington compound duplex engine of 1,500,000 gallons daily capacity, and a Worthington high pressure engine of 1,000,000 gallons capacity, through 2,446 ft. of 12-in. pipe, to a reservoir holding 1,250,000 gallons 93 ft. above the pumps, or 116 ft. above the river. Distribution is by cast-iron pipe of from 16 to 4 in. diameter. On May 1, 1880 the date of the latest obtainable statistics, there were 11.8 miles in use, with 101 fire hydrants, 83 gates and 130 taps. It is not known what kind of service pipes are used.

The population in 1880 was 5,280 and the daily consumption 213,000 gallons.

The works cost $111,068.60. The cost of maintenance the first year was $4,872.96 and the revenue $3,844.76. The works are managed by three trustees, elected by the people.

(TO BE CONTINUED.)

ADDITIONS & CORRECTION.—Nov. 11, p. 388 and Nov. 25, p. 405, for *Middleton*, read *Middletown*.

Nov. 18, p. 399. *St. Joseph, Missouri.* L. W. Densmore, corrects the description of the topography as follows: The city lies on the Blacksnake Hills, and a strip of bottom land enclosed between them and the river, not more than 3000 ft. wide at the widest point, about ⅗ of the population residing on the hills, the highest parts of which are about 180 ft. above high water in the river. The city is intersected by two valleys, in one of which, next the reservoir, flows Blacksnake Creek, about 5 miles long. The other valley, at its debouchure from the hills, ⅛ of a mile from the river, has an elevation above the river of about 40 ft., but might be turned by a detour of about 1½ or two miles.

For *Clew*, Secretary, read CHEW.

The receipt of statistics as follows, is acknowledged with thanks:

From B. Walker Peterson, C. E., statistics and water-rates of the water-works of Wheeling, W. Va.

From Roger P. Atkinson, C. E., statistics of the water-works of the Western N. C. Insane Asylum, Greensboro, N. C.

From A. F. Matlack, City Clerk, statistics and water-rates of the water-works of Steubenville, Ohio.

From T. N. Bartelle, C. E., statistics of the water-works of Fort Dodge, Iowa.

From D. M. Swan, Secretary, statistics and water-rates of the water-works of Leavenworth, Kansas.

From W. E. Pettee, statistics of the water-works of Canaan, Conn., Cheshire, Mass., and Richmond Furnace, Mass.

THE AMERICAN PUBLIC HEALTH ASSOCIATION.

To the Members of the Advisory Council of the American Public Health Association, and other Officers and Members of the Association:

GENTLEMEN: The American Public Health Association, during the ten years of its existence, has given original force and direction to much of that spirit of inquiry as to public health and State medicine in the United States, which now so largely secures public attention. Its mission for good, while still that of popularizing sanitary science and applying sanitary art, has come to demand such expert skill as can define methods with precision and present them with the supports, either of experiment, of fact, of logic or of experience. It is not now so much to insist upon certain things as necessary, as to present and enforce how best to do them. To this end we desire—

I. To arouse the present active membership to such early and specific study as will lead such as offer papers, to give us the results of their patient industry and their careful experience.

II. To induce additional members of State and city boards, who are engaged in health offices in their respective localities, to become members of the Association.

III. To outline so early the chief subjects for our next meeting at Detroit, as to give full time for careful research.

IV. To turn the attention of our membership so earnestly to the needs of a well-sustained National Health Service as shall lead each, in their respective States, to be importunate that there be no curtailment of power and resources in such direction.

To these ends, as your presiding officer for the year, I ask—

I. That the Advisory Council, and other officers, will feel themselves especially charged with the duty of recommending to the Executive Committee, members from their respective States, whose applications the committee may consider at its meeting in February, 1883. The application should state "the business or profession and special qualifications of the person so proposed," and may be sent either to the President or Secretary. Although the membership is large, it is noticeable that some of the States have a small attendance, which can be increased if members of boards of health and the local members of the Advisory Council take the matter specifically in hand.

While physicians naturally form the nucleus of such an association, it is very important that it represent the whole scope of hygiene and of sanitary art.

To this end we ask that you also select from your own State, for recommendation, such educators, engineers, plumbers, architects, chemists, or other scientists, as will aid in illustrating the applications of their specialties to the art of preserving life.

II. That persons desiring to offer papers on any special subject, early apprise us, so that the outline for the year may include such subjects as are approved by the Executive Committee.

III. That the members of the Advisory Council in each State see to it, that by honorable and direct effort their Representatives in the National Congress, are made fully acquainted with the present status of national health administration, and the reasonable provision, both as to law and appropriation, requisite for a proper defense of the national health, "*Salus populi suprema est lex.*" Such welfare not only includes health, but has its protection as a primal idea.

I will be glad to receive any suggestions tending to aid these purposes, and so promote the efficiency of the Association, and will present them to the Executive Committee at its first meeting.

(Signed) EZRA M. HUNT,
President of A. P. H. Association.

TRENTON, Nov. 15, 1882.

ENGINEERS' SOCIETIES.

ENGINEERS' CLUB OF PHILADELPHIA.

ROOMS, NO 1523 CHESTNUT ST., PHILADELPHIA, PA.

Record of Regular Meeting.

November 4, 1882, Past President Frederick Graff in the chair. Twenty members present.

Mr. John Haug, in presenting the club with a copy of Lloyd's Rules for Iron Ships, stated the number and tonnage of ships built in Great Britain in 1881 as follows:

	Built in 1881.			Lost in 1881.	
	Number.	Tonnage.	Material used.	Number.	Tonnage.
Steel steamers	34	68,366	32,000 tons	1	1,536
Steel sailing vessels	3	3,167	1,500 tons		
Iron steamers	411	500,503	300,000 tons	139	138,370
Iron sailing vessels	50	68,650	34,000 tons	52	43,936
Wooden steamers	30	1,659		18	1,704
Wooden sailing vessels	259	16,448		821	168,579
Total	787	748,793		1,031	354,125

The principal changes in the rules for 1882 have been in water-tight bulkheads, of which more are now required in longer and larger vessels, and they are to be extended to the principal upper deck.

Vessels of extreme proportions (over 11 depths in length) have to be better strengthened in their top and bottom members, by doubling strokes, etc.

Treble riveted butt-straps are required to a greater extent, as forming stronger joints.

The rules for boilers, machinery, pumping arrangements, spare parts for machinery, etc., have been extended and improved, with a view to greater safety at sea.

As ship-building of steel is increasing, a reduction of 20 per cent. from the scantlings required for iron is permitted, giving ships so much more carrying capacity. A complete set of rules for testing all materials insures uniform quality in steel used. Steel castings, by the Siemens-Martin or Bessemer process are also now used, in place of large and expensive forgings, for stemports, rudders, stems, etc., and they have been found strong and tough; they are less expensive than scrap-iron forgings, and the risk of bad welds and inconvenience of rough and uneven shape is avoided.

The latest circular issued by Lloyd's Register offers to fix a proper load line for each vessel, according to its style, form, etc.; thus the rules not only provide for its proper strength, but also its sea-going qualities, etc. This is of the greatest importance in view of the many disasters that have occurred from the want of those qualities.

Mr. Haug also exhibited and described drawings of his own and other valve gears.

The one patented by Mr. Haug belongs to that class in which the longitudinal and lateral motion of an eccentric or other rod are both utilized for obtaining a variable cut-off and reversing motion. In comparison with F. C. Marshall's and Joy's valve motions, which have both been extensively used, this valve motion consists of fewer parts and joints, can be more compactly arranged, and has the least amount of motion to all its parts, being thus more accessible for oiling, etc. Compared with the link motion, it is considerably simpler, has less friction (all sliding friction being replaced