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# The Manual

OF

# American Water-Works

COMPILED FROM SPECIAL RETURNS.

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Containing the History, Details of Construction, Source and Mode of Water Supply, Pumping Machinery, Dams and Reservoirs, Filters, Distribution, Consumption, Pressure, Hydrant Rental, Revenue and Expenses, Cost and Debt, etc., etc., of Every Water-Works in the United States and Canada.

WITH SUMMARIES  
For Each State and Group of States ;

FAMILY AND METER WATER RATES  
Charged in 800 Cities ;

AND DIRECTORY  
Of Water-Works Officials, Engineers and Contractors.

THIRTY ILLUSTRATIONS OF DAMS AND RESERVOIRS.

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TABLE 1-S.

UNITED STATES AND CANADIAN WATER-WORKS—SUMMARY OF DATES OF CONSTRUCTION BY GROUPS OF STATES.

[Date of completion taken when construction extended over more than one year.]

Year.	WATER-WORKS BUILT.								Total U. S.	Canada.
	N.E.	Mid.	S. Atl.	So. C.	N. C.	N. W.	S. W.	Pac.		
B'forc } 1800	1	3	1	..	..	..	..	..	5	..
800-10..	3	6	..	..	..	..	..	..	9	1
1810-20..	2	1	..	..	1	..	..	..	4	..
1821-30..	1	5	3	1	1	..	1	1	13	..
1831-40..	3	3	3	6	3	..	..	1	19	1
1841-50..	3	12	1	1	2	..	..	..	19	4
1851. . .	1	3	..	..	..	..	..	..	4	..
1852. ....	1	4	..	..	..	..	..	..	5	..
1853. ....	..	2	..	..	..	..	..	2	4	1
1854. .... (1)	2	3	1	..	..	..	..	..	(1) 6	..
1855. ....	4	2	..	..	..	..	..	..	6	..
1856. ....	1	3	1	..	1	..	..	..	6	1
1857. ....	2	(1) 5	..	..	..	..	..	1	(1) 8	..
1858. ....	..	2	2	..	..	..	..	1	5	..
1859. ....	1	5	..	..	..	..	..	2	8	1
1860. .... (1)	2	4	..	1	2	..	..	..	(1) 9	1
1861. ....	1	3	..	..	..	..	..	1	5	..
1862. ....	3	..	..	..	1	..	..	3	7	..
1863. ....	..	1	..	..	..	..	..	..	..	1
1864. ....	1	1	..	1	..	..	..	1	4	..
1865. ....	1	2	..	..	..	..	..	5	8	..
1866. ....	2	3	..	..	1	..	..	2	8	..
1867. .... (1)	2	5	..	1	..	1	..	1	(1) 10	..
1868. .... (1)	4	6	..	1	2	..	..	2	(1) 15	..
1869. .... (1)	9	4	..	..	5	..	..	2	(1) 20	..
1870. .... (3)	5	10	..	1	9	2	..	2	(3) 29	1
1871. .... (1)	2	16	1	..	6	2	1	7	(1) 35	..
1872. ....	8	13	1	2	8	..	1	1	34	1
1873. ....	15	12	1	2	13	..	1	5	49	3
1874. ....	7	(1) 12	1	..	9	2	1	6	(1) 38	2
1875. ....	9	(2) 14	2	..	9	2	3	4	(2) 43	2
1876. .... (1)	10	(1) 13	2	1	11	(1) 5	1	5	(3) 48	3
1877. ....	3	(1) 4	1	..	4	1	..	(1) 2	(2) 15	1
1878. .... (1)	6	11	2	..	(1) 4	4	2	(1) 2	(3) 31	2
1879. .... (1)	9	14	..	2	19	3	6	(1) 1	(2) 45	2
1880. .... (1)	6	9	2	1	6	4	5	5	(1) 38	(1) 2
1881. .... (1)	8	10	2	1	7	6	4	2	(1) 40	3
1882. .... (3)	9	(6) 14	4	1	(1) 22	13	9	9	(10) 81	5
1883. .... (1)	9	(3) 23	2	2	16	19	14	4	(4) 89	4
1884. .... (1)	22	(3) 24	1	1	18	20	17	7	(4) 110	(1) 4
1885. .... (3)	18	(1) 23	5	1	26	9	12	4	(4) 103	..
1886. .... (2)	19	(2) 32	7	6	(1) 37	25	11	5	(5) 142	5
1887. .... (7)	25	(1) 37	8	5	(1) 32	39	15	13	(9) 174	7
1888. .... (2)	23	(3) 37	13	18	66	63	(1) 32	27	(6) 234	(1) 12
1889. ....	19	(3) 39	(1) 16	(1) 12	38	(1) 38	10	22	(6) 194	7
Unkn'n (1)	9	(3) 19	3	2	3	8	5	5	(4) 54	7
Totals	(34) 291	(31) 478	(1) 91	(1) 70	(4) 373	(2) 266	(1) 151	(3) 163	(77) 1,883	(3) 84

Subsidiary water-works, viz.: those which derive their supply from the mains of some other adjacent works, but are otherwise independent systems, are enumerated above in parentheses.

Canada in this and the following tables includes 4 Newfoundland works.

The growth of the water-works interest from the start is shown in detail by Tables 1 to 3-S. Table 1-S gives the number of works built in each group prior to 1800, and in each decade since then to 1850, then by years to the present time. Table 2-S gives the same for decades to 1850 and for half decades since, and Table 3-S shows the total number of works in each group at the close of each decade.

It will be seen by examining Table 1-S that there were in 1800 five works in the United States, all in the first three groups, and that each decade to

1850, and each year thereafter, excepting 1863, has given an increase to the number. The total number of works built during the war period, 1861-5, was but 24, or only two-thirds as many as were built in the preceding five years, while in one of the war years, 1863, water-works construction was entirely suspended.

TABLE 2-S.

UNITED STATES AND CANADIAN WATER-WORKS—SUMMARY OF CONSTRUCTION BY GROUPS OF STATES, DECADES AND HALF DECADES.

[Date given is that of completion of works.]

Date.	N.E.	Mid.	S. Atl.	S. C.	N. C.	N. W.	S. W.	Pac.	Total U. S.	Canada
Before 1800	1	3	1	..	..	..	..	..	5	..
1800-10..	3	6	..	..	..	..	..	..	9	1
1811-20..	2	1	..	..	1	..	..	..	4	..
1821-30..	1	5	3	1	1	..	1	1	13	..
1831-40..	3	3	3	6	3	..	..	1	19	1
1841-50..	3	12	1	1	2	..	..	..	19	4
1851-55..	(1) 8	14	1	..	..	..	..	..	(1) 25	1
1856-60..	(1) 6 (1)	19	3	1	3	..	..	4	(2) 36	3
1861-65..	6	6	..	1	1	..	..	10	24	1
1866-70..	(6) 22	28	..	3	17	3	..	9	(6) 82	1
1871-75..	(1) 41 (3)	67	6	4	45	6	7	23	(4) 199	8
1876-80..	(4) 34 (2)	51	7	4	(1) 35 (1)	17	14	(3) 15 (11)	177 (1) 10	10
1881-85..	(9) 66 (13)	99	14	6	(1) 89	67	56	26	(23) 423	(1) 16
1886-9..	(11) 86 (9)	145	(1) 49	(1) 41 (2)	173 (1)	165	(1) 68	67	(26) 794	(1) 31
Unk'wn	(1) 9 (3)	19	3	2	3	8	5	5	(4) 54	7
	(34) 291	(31) 478	(1) 91	(1) 70	(4) 373	(2) 266	(1) 151	(3) 163	(77) 1,883	(3) 84

TABLE 3-S.

UNITED STATES AND CANADIAN WATER-WORKS—NUMBER OF WORKS BY GROUPS OF STATES AT THE END OF EACH DECADE.

1800....	1	3	1	..	..	..	..	..	5	..
1810....	4	9	1	..	..	..	..	..	14	1
1820....	6	10	1	..	1	..	..	..	18	1
1830....	7	15	4	1	2	..	1	1	31	1
1840....	10	18	7	7	5	..	1	2	50	2
1850....	13	30	8	8	7	..	1	2	69	6
1860....	(2) 27 (1)	63	12	9	10	..	1	8	(3) 130	10
1870....	(8) 55 (1)	97	12	13	28	3	1	27	(9) 236	12
1880....	(13) 130 (6)	215	25	21	(1) 108 (1)	26	22	(3) 65 (24)	612 (1) 30	30
1889....	(34) 291 (31)	478	(1) 91	(1) 70	(4) 373	(2) 266	(1) 151	(3) 163	(77) 1,883	(3) 84

In the South Atlantic States from 1859 to 1870 inclusive, 12 years, not a single water-works was built. In the Northwestern group the first plant was constructed in 1867, while in the Southwestern States save one between 1821 and 1830, not a single plant was built until 1871. The marvellous growth in this section since 1871 has been commented on above.

The number of works in Canada at the end of each decade is shown in more detail by provinces as follows:

	At the end of—					In
	1850.	1860.	1870.	1880.	1885.	1889.
In Ontario .....	2	4	5	14	21	41
Quebec.....	1	2	2	10	14	19
Manitoba.....	..	..	..	..	1	1
British Columbia.....	..	..	..	..	..	4
New Brunswick.....	1	2	2	3	5	6
Nova Scotia.....	1	1	1	2	4	11
Prince Edw. Isl'nd.....	..	..	..	..	..	1
Total, Dominion of Canada.	5	9	10	29	45	83
Newfoundland.....	1	1	2	2	3	4

Perhaps the most interesting of these three tables is the last one, 3-S, which shows the number of works in each group and in Canada, and the total in the United States at the end of each decade. The increase and