

A central rapid filtration plant superseded both the rapid and slow filters June 7, 1937. On November 27, 1937, Frank Hall, Superintendent, wrote that the Blessing filters were being scrapped. During the last three years of their use a coagulant was employed the year around. Latterly, the sand in the Blessing filters had been taken out and washed once a year. Black and lumpy sand in the ends of the filters where there was no agitation by the revolving arms, was replaced by new sand.

Thus came to an end the earliest mechanical filters in Massachusetts and the earliest permanent installation in New England, after a half century of service.

*Ottumwa, Iowa.*—At Ottumwa, Iowa, a thousand miles west of Athol, the only other known Blessing filter on a municipal supply was installed late in 1890 or early in 1891. It was preceded by one of the largest known American sets of charcoal filters and followed in 1895 by Jewell gravity filters (34).

### *Three Jewells and Their Filters*

As the Hyatt, National and American filter companies were about to merge and the Warren filter was coming to the front, the Jewell filter entered the municipal field. It had been under promotion for several years, both at home and abroad, but chiefly in the industrial field. Once established in the municipal field it attained prominence. The three Jewells—Omar H., and his sons, Ira H. and William M.—took out about 50 patents in 1888–1900. The earliest were granted to Omar H. Jewell; later ones to him and one or both sons, or to one son alone.

Omar H. Jewell was born at Wheaton, Ill., June 1, 1842. As master mechanic for grain elevators he became interested in improving the quality of boiler feed water from the notoriously foul Chicago River. The first of his filters seen by his son William was located in Elevator L, of Armour, Dole & Co., on the South Branch of the Chicago River. Probably it was built in or about 1885. The Jewell Pure Water Co. was organized and largely financed by James B. Clow & Sons, well known Chicago dealers in water works supplies. W. E. Clow, chairman of the Clow concern, stated in 1937 that in the earlier years he had charge of sales and sold filters in England, France, Germany and Italy. The elder Jewell devoted himself to manufacturing the filters.

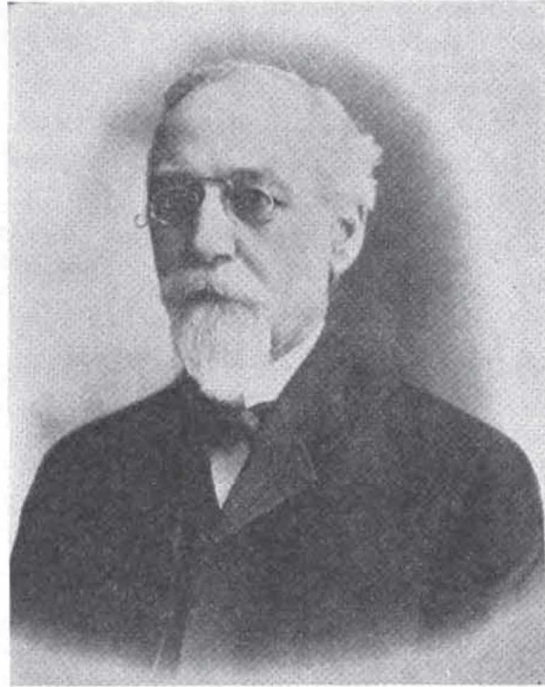


FIG. 47. THE THREE JEWELLS—FATHER AND SONS  
*Top:* OMAR H. JEWELL (1842-1920)  
*Left:* IRA H. JEWELL (1869-1940)    *Right:* WILLIAM M. JEWELL (1870-1940)  
(From photographs supplied by Ira and William Jewell)

William M. Jewell became chemist of the Jewell Pure Water Co. in 1887, following graduation from the College of Pharmacy, University of Illinois, at the early age of 17. With his father and brother the firm of O. H. Jewell & Sons was formed in 1890. It was soon incorporated as the O. H. Jewell Filter Co., which continued in business until it merged with two other companies in 1900. William Jewell was in Europe from October 1888 to December 1889, assisting Jewell agents in erecting "steel tank pressure filters," made in Chicago and shipped abroad complete. These seem to have been for industrial use. In the late 1890's while George F. Hodgkinson was manager of the O. H. Jewell Filter Co. at Chicago, Ira and Ariel \* Jewell were sent to Moscow to supervise the operation of an experimental filter plant for a few months. Nicholas Simin had previously visited the United States and arranged for the installation. The Morison-Allen Co. and then the Morison-Jewell Filtration Co. represented the O. H. Jewell Co. in New York and Philadelphia from about 1888 to 1898. William B. Bull of Quincy, Ill., was Vice-President of the O. H. Jewell Filter Co. in the late 1890's.

The first Jewell filter patent was granted to Omar H. Jewell February 7, 1888, and nine more followed. Five of the ten were for a feed-water purifying apparatus.

Electrodes placed in a dome located on the top of a filter tank were an element of one of Omar H. Jewell's early applications for a patent filed December 17, 1887, and granted July 10, 1888 (No. 386,073). The electrodes were connected with a battery or other source of electricity. This was one of the earliest patents on the use of electrolysis in water treatment. Among the many other patents granted to Omar H. Jewell were several on strainers or screens for underdrain washing systems; revolving sand agitators; a settling chamber below the filter; and means for maintaining a partial vacuum in filters (negative head), both process and apparatus.

Ira H. Jewell's earlier patents included one on apparatus for continuous cleaning of filters of large area by lifting, successively, portions of the sand and supernatant water by a pump on a truck on a movable platform, above which was a screen to separate the water and its load of impurities from the filtering material as the water went to waste.

\* Ariel Clyde Jewell, wrote Ira H. Jewell on Aug. 8, 1936 (46), "built up a large business in water distilling, operating under the trade name 'Polarstill.' . . . He died several years ago."

Perforated pipes were placed beneath the screen to convey steam or other sterilizing agents. The sand thus cleaned and sterilized was returned to place. (Patent dated August 10, 1897; filed November 7, 1892.) A later patent granted to Ira H. Jewell (May 8, 1900) covered a traveling filter washer similar to the one just described, combined with a horizontal-flow surface-jet wash, revolving sand stirrer arms and a multiplicity of air pipes adapted to discharge air under pressure upward through the filter.

An electrolytic process for producing hydrate of iron for use as a coagulant to be applied to a filter was patented by William M. Jewell July 17, 1900. Two other patents of the same date were on a method and apparatus for producing "a purifying reagent" (coagulant) by "subjecting water to the action of sulfurous-acid gas, passing the solution so formed over iron and converting the resulting solution into ferric sulfate by oxidation." A filter rate-of-flow controller was patented by William Jewell February 23, 1897. A similar device was used on the Jewell filter during the Louisville filtration experiments, 1895-96. William Jewell believed this to have been the first use of such a controller on a mechanical filter.

*Brockton, Mass.*—The first known attempt to introduce Jewell filters into an American municipal supply was made at Brockton, Mass., in 1888. The report of the Brockton Water Board for that year states that the Morison-Allen Co., New York City, petitioned the mayor, council and water board to allow a demonstration of one of its small filters on the Brockton works. Apparently Brockton would have installed Jewell filters had it not been for the strong objections of the Massachusetts State Board of Health.

*Rock Island, Ill.*—The first Jewell filter for a municipal supply was put into use at Rock Island, Ill. Installed in 1891, its object was "to clarify the water." Because it was too small it was shut down in two months, but after enlargement, operation was resumed. In 1899, settling basins and slow sand filters were built. In 1911 a return was made to rapid filtration, using open rectangular filters.

▮ *Subsequent Plants.*—Five other Jewell plants for city water supply were put in use in 1891. By May 1896, a total of 21 plants had been completed and one was under construction. The largest of these was a 10-mgd. plant for the Wilkes-Barre, Pa., Water Co., put in use in 1895. Next in size was a 4.5-mgd. plant completed by the Niagara Water Works Co. in March 1896. Gravity filters were used in eight-

een of the 21 plants. Of the three pressure plants, the one at Chattanooga was installed to work with existing filters of the pressure type and those at Terre Haute and Lake Forest were put in on direct pumping systems. Steam for cleaning and sterilizing filters was used at all the plants (34).

A multiplicity of strainers appears to have been the rule in the early Jewell filters. The strainer described and illustrated for the Wilkes-Barre filters, and apparently the type generally used, was a perforated aluminum-bronze plate, placed across a cup screwed into the underdrain and wash pipe. Between the plate and the bottom of the cup was a deflector to spread the wash water and steam. The filters were washed by reverse flow, aided, in the typical gravity filters, by revolving-rake sand agitators. These consisted of horizontal arms from which numerous rods extended to the bottom of the filter. Subsidence or coagulation chambers were provided in most of the plants described in the article of 1896. These were small compared to the rated daily capacity of the filters, except at Creston, Iowa, where the chamber capacity was 0.5 mil.gal. compared with a filter capacity of 0.7 mgd. This was really a presettling reservoir.)

After protracted litigation brought by holders of the Hyatt coagulation-filtration patent of February 19, 1884, against users of Jewell filters employing a coagulant, the U.S. Circuit Court of Appeals upheld preliminary injunctions against the Elmira Water Works Co. and the Niagara Falls Water Works Co. in 1897 (47). The settling chambers below the filters, it was held, were too small to avoid infringement of the patent.\* Nor did they provide the independent settling reservoirs for coagulation which Hyatt claimed his process made unnecessary.

Early in 1898, the O. H. Jewell Filter Co. settled with the New York Filter Manufacturing Co., holder of the Hyatt coagulation patent, for infringement, and took out a license for the use of the Hyatt patent in the central area, including Tennessee and Kentucky, and west of the Mississippi River. The New York Filter Manufacturing Co. agreed to confine itself to the eastern area, within which it was to supply the Jewell filter. The Morison-Jewell Filtration Co. of New York and Philadelphia settled for infringements and retired from business,

\* Coagulation basins with a holding capacity of 2.5 mil.gal., or nearly half the daily capacity of the filters, were constructed at Elmira in 1937. The old chambers beneath each Jewell filter had a detention period of about 20 min. (48, 49).

but its Vice-President and General Manager, Samuel L. Morison, of New York, became general manager of the New York Filter Manufacturing Co. (50). In 1900, the New York Filter Manufacturing Co., the O. H. Jewell Filter Co. and the Continental Filter Co. consolidated as the New York Continental Jewell Filtration Co. Omar and William Jewell made a five-year contract with the consolidated company. Subsequently, William Jewell began private practice, largely as a consultant. Ira Jewell continued to operate independently, as he had been doing for some time past. He was engaged in much litigation, notably an unsuccessful suit against the city of Minneapolis for alleged infringement of down-draft or negative-head and central operating-control patents.

A subsurface filtering and washing system introduced by Ira H. Jewell about 1935 has been applied to a number of plants (51). Wire mesh screens set in large castings near the top of the filter are supplied from below with water for filtration or for washing. The main portion of the filter is washed by the usual reverse-flow method from the bottom. In principle, this was similar to the subsurface washing system of the National filter, forty years earlier.

Omar Jewell died in 1930 at the ripe old age of 88. Ira and William died in 1940.

The Jewell Export Filter Co. was organized about 1900 to exploit filters overseas. In a catalog published in 1903 it was stated that the company had offices at York, England; Berlin, Germany; Trieste, Austria; Moscow, Russia; Alexandria, Egypt; and Arnheim, Holland. In 1912 it had representatives also in Johannesburg, South Africa; Japan; and China. It then reported fifteen installations in Russia and ten in India, besides plants in many other countries. It had only three plants in England in 1912. On the Continent it had few installations in 1912, outside Russia, but some years later Jewell filters were installed at Warsaw, Poland, and the plant was said to be the largest in Europe up to that time. It was reported to have been destroyed or at least badly damaged during the Nazi blitzkrieg of 1939.

In 1903, S. L. Morison of New York, who had been connected with various companies promoting Jewell filters for many years, was Vice-President and General Manager of the Jewell Export Filter Co., and R. W. Lawton was Engineer of Construction. Edmund B. Weston, who as Assistant City Engineer in charge of water works at Providence, R.I., conducted the Providence filtration experiments in 1893-94, was

President and General Manager of the company for many years before his death late in 1916. His headquarters were at Providence, but he traveled widely, going abroad annually for many years before the outbreak of World War I.\*

### *The Continental Filter Company*

The Continental Filter Co. came to the front in the early 1890's and obtained enough importance by 1900 to have its name included in the third great consolidation of filter companies, the New York Continental Jewell Filtration Co. It was incorporated in West Virginia, November 20, 1891, with offices in New York. At the time of its consolidation it had built filter plants for six municipal supplies. It was not dissolved until June 1927.

Three Williamsons—David, David Charles and James E.—were Continental filter patentees and engineers. David was the pioneer. He was the Chief Engineer of the Continental Filter Co. during the nineties. David C. was successively draftsman, erecting engineer and assistant engineer of the company from 1897 until it entered the consolidation of 1900. After being with the new company six years he became chief engineer of its filter department, which position he held at least until the close of 1912. Charles L. Parmelee was Chief Engineer of the Continental Filter Co. from March 1899 until the consolidation in 1900. Apparently he was the engineer for the New York Continental Jewell Filtration Co. for a short time in 1900 and held the position until a few years before the company was sold by receivers to the American Water Softener Co. in 1925. He was in private practice at the time of his sudden death in March 1937.†

Nine American patents were granted to the Williamsons between 1892 and 1900, and one to James E. Williamson in 1908.‡ The first patent was for a centrifugal filter. It was issued to David Williamson February 16, 1892. David Williamson's second patent (June 28, 1892)

\* The Jewell Export Filter Co. still had offices at Providence in September 1942, but the nature and extent of its recent operations could not be ascertained.

† These notes on the Williamsons and Parmelee have been drawn from testimony by the latter and by David C. Williamson in Defendant's Record, *Ira H. Jewell vs. City of Minneapolis*, December 1912; from correspondence with George F. Hodgkinson, of Philadelphia; and from records of the American Water Works Association.

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## CHAPTER VIII

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## CHAPTER IX

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