



INTERNATIONAL

MINING

Technology

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HALL OF FAME

## John Dorr / CONCENTRATION



John Van Nostrand Dorr was born in Newark, N. J. in 1872. He graduated from Rutgers in 1894, with a B.S. in chemistry and became chemist at a smelter at Deadwood, S. D., in the Black Hills. This was a period of great developments in metallurgy, when the refractory gold ores of "The Hills" were being treated by smelting, chlorination, and the newly developed cyanide process. In 1902 he formed a partnership with John Lundberg, a mine leaser, to operate a cyanide mill, the Rossiter Mill, to treat gold ores from Lundberg's two leaseholds, the Buxton and the Bonanza Mines. In 1903 the partners purchased the two mines, erected a 100-ton per day wet crushing cyanide mill on the site, and took in a third partner, A. D. Wilson, a civil engineer. At the Lundberg, Dorr & Wilson mill, Dorr tried out the new Moore filter process, a large cone for the continuous collection of slimes, and a Chile mill in place of the stamps used in the district. To effect a clean-cut separation between fine slimes and coarse sands prior to separate cyanide treatment, the Dorr clarifier was developed, patented, and arrangements made for its manufacture. The clarifier became the Dorr classifier.

Wet ball mills were being tested on the gold ores in South Africa and copper ores in Arizona and the Dorr classifier made continuous closed circuit grinding a reality. The ball mill – rake classifier circuit (spiral classifiers were also used) were used for 50 years until the development of better pumps enabled hydrocyclones to replace mechanical classifiers.

John Dorr invented other machines which were widely used for processing minerals, for example the Dorr continuous thickener and the Dorr agitator, but it was the classifier which transformed the technology.



John Dorr was one of the great inventors of methods to process solid particles and he was quick to take these methods from ideas to operating practice.

1 - In 1906 Dorr was engaged as consultant on the remodelling of the dry crushing mill of the Mogul Mining Co., which was having trouble with slime collection. He conceived the idea of continuous slime thickening in flat-bottomed tanks and developed the first Dorr continuous thickener. In 1910 came the Dorr agitator and later two new principles: continuous countercurrent decantation and closed circuit grinding. The engineering principle underlying these inventions was that mechanical means were necessary for most efficient continuous handling and treatment of finely divided solids suspended in liquids. Manufacturing arrangements were made in Denver and Chicago and Dorr began to build an engineering organization to market his inventions and the engineering services that went with them, while continuing to manage two mining properties in the Black Hills. In 1910 the Dorr Cyanide Machinery Co was formed to become in 1916 the Dorr Co., Engineers.

2 - The technological developments in ore dressing and wet metallurgy during the 1920's greatly increased the demands for Dorr machinery and engineering services in this country and abroad and territorial growth began. The Dorr Co built offices in many cities. Originally the Company's business was related directly to the cyanidation of gold and silver ores in this country and in Mexico. The iron, lead, copper, phosphate, and sand fields were also entered in a small way. Ultimately not only all of wet metallurgy, but also most of heavy chemical and industrial processing, sugar manufacture, and sewage, water, and trade-waste treatment became Dorr customers.

3 - The loan in 1914 of a small experimental thickener to Chicago's Sanitary District led to a vast new field which in normal times amounts to about one-third of the Company's business. The initial objective was the continuous clarification of domestic sewage. The clarifier, an adaptation of the thickener principle, proved to be the solution. Intensive studies of this new field resulted in the development of a complete line of special equipment, which has been found to be directly applicable to the treatment of municipal sewage and water supplies, and to liquid industrial wastes and sources of process water. The three original machines, produced with only a nominal development cost, have been expanded to over 30, of which there are over 75 different types. However all are inherently based on the same fundamental principles involving classification, sedimentation, and agitation.

4 - John Dorr, in association with Francis Bosqui, published two editions of "Cyanidation and Concentration of Gold and Silver Ores". This was a seminal book for mineral processors.

#### **History of Dorr-Oliver**

1904 Dorr Company founded by Dr John Van Norstrand Dorr, 1872-1962. Began his career at 16 years of age working in the laboratories of Thomas Alva Edison

1907 Oliver Company founded by Dr Edwin Letz Oliver, 1878-1955. A Californian from San Francisco and a graduate of the University of California

1914 The Sanitary District of Chicago installs a new Machine called a Dorr Clarifier

1916 The first DORRCOTM suction pumps are built

1919 Dorr develops the washer and slurry mixer

1920 Dorr develops the Cane Juice Clarifier and sells the first one through a Representative in Havana Cuba

1921 Dorr develops the Olivite® Centrifugal Pump

1923 Dorr develops Rectangular Clarifiers for Sewage Treatment

1925 Dorr develops Washing Tray Thickener and opens overseas offices in Paris and Berlin

1927 Dorr designs the Detritor® for Sewage Degritting

1931 Dorr and Oliver merge. Dorr establishes a facility in The Hague, Netherlands

1933 Dorr establishes representation in India

1934 Dorr and Oliver dissolve

1935 Dorr develops the Torq Thickener

1937 Dorr develops a combination Washing Type Tray Thickener

1938 Dorr develops the Siaker

1954 Dorr and Oliver merge for the second time

1955 Merrill Company acquired and adds the Merco® Centrifuge

1968 Dorr-Oliver introduces the Cabletorq® Thickener. Curtis Wright acquires majority stock in Dorr-Oliver

1969/1970 ODS® Spring Assist and Air Cylinder assist introduced to the market

1979 Curtis Wright completes acquisition of Dorr-Oliver

1981 Kennecott acquires Dorr-Oliver: Kennecott and SOHIO merge

1987 Contor Holdings, a Canadian company, acquires Dorr-Oliver and Keeler Boiler

April, 1988 Leveraged buy-out by Dorr-Oliver management

May, 1995 Krause-Maffei, Germany acquires Dorr-Oliver

Sep, 1999 GL&V, Montreal acquires Dorr-Oliver

Sep 2000 Hazleton, PA manufacturing closed

Nov, 2002 GL&V purchases Eimco, Salt Lake City, UT; Dorr-Oliver and Eimco are integrated

Aug, 2007 FLSmidth Minerals, acquires Dorr-Oliver Eimco



*John Van Nostrand Dorr (1872-1962)*