Power Plant History of the Pikes Peak Region

Presented by Chris Thompson

Power Timeline

1879 – Perfected Arc Lighting System (Cleveland, OH)
1879 – First Incandescent Light Bulb (Menlo Park, NJ)
1880 – First Hydroelectric Plant, Brush Arc System(Grand Rapids, MI)
1886 – First use of Transformers (Great Barrington, MA)
1886 – Westinghouse Electric Company organized
1888 – Rotating Field AC Alternator invented
1889 – First AC Hydroelectric Plant (Oregon City, OR)
1891 – First use of AC power for industrial use (Ames, CO)
1892 – General Electric Company organized

October 29,1886 at 7:30pm

60kw Capacity
Two 45hp Steam Engines, two 30kw Generators
One 80hp boiler

Supplied DC power to 300 customers and five 100 candle power streetlights.

Service was from Sunset to Midnight every night.

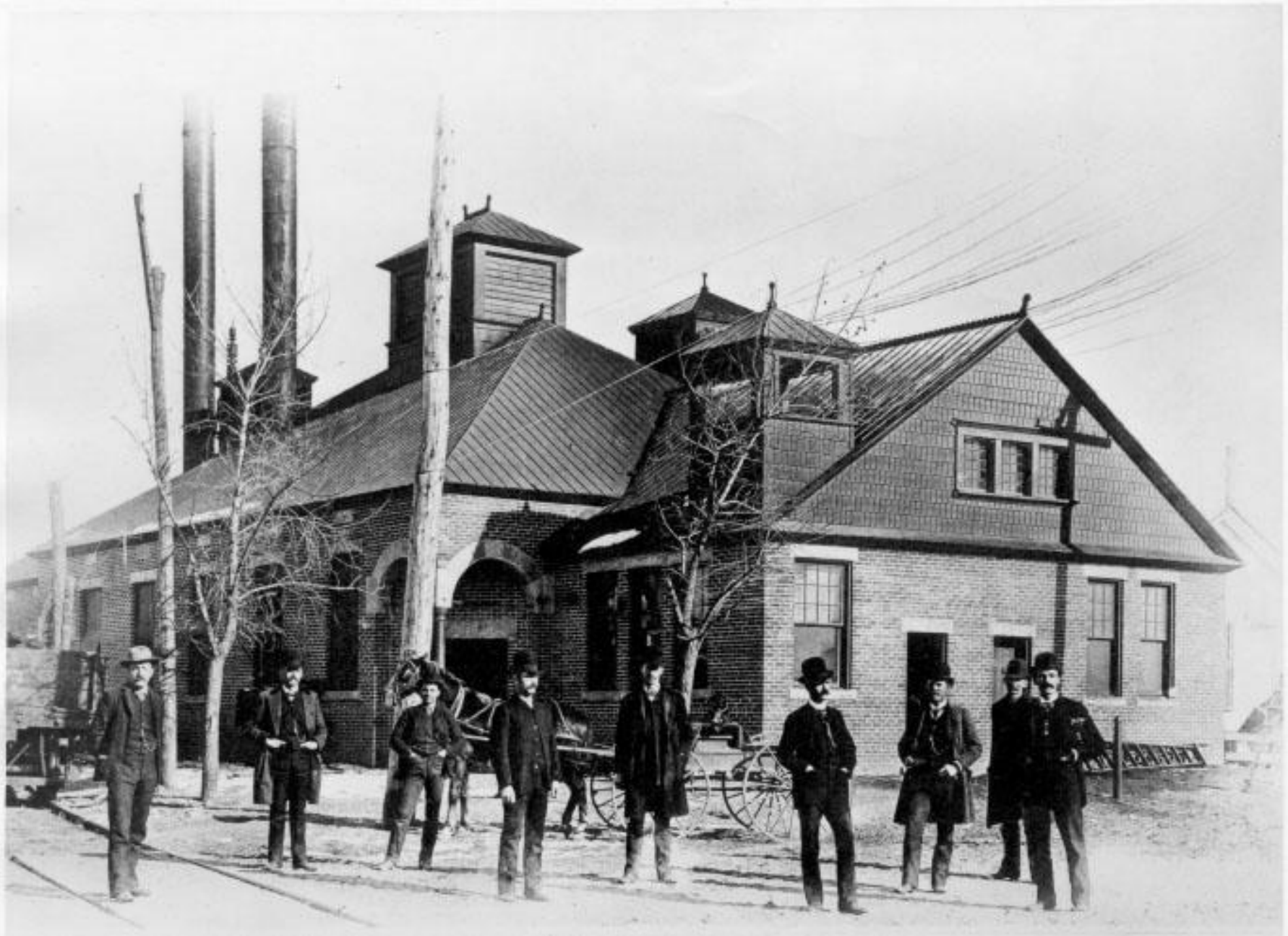
Substation A

Built by the El Paso Electric Company in 1888

Burned down March 21, 1889, but operation resumed 36 hours later in tents.

Enlarged and new equipment added many times, but out of service by 1925.

Torn down in 1960.



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Lake Moraine Hydro Plant

In service July 1898.

225kw, 25 cycle, 3 phase Generator, driven by a Pelton Turbine.

Owned and operated by the Colorado Springs and Cripple Creek District Railway to power the Cripple Creek District Streetcars.

Abandoned in 1910.

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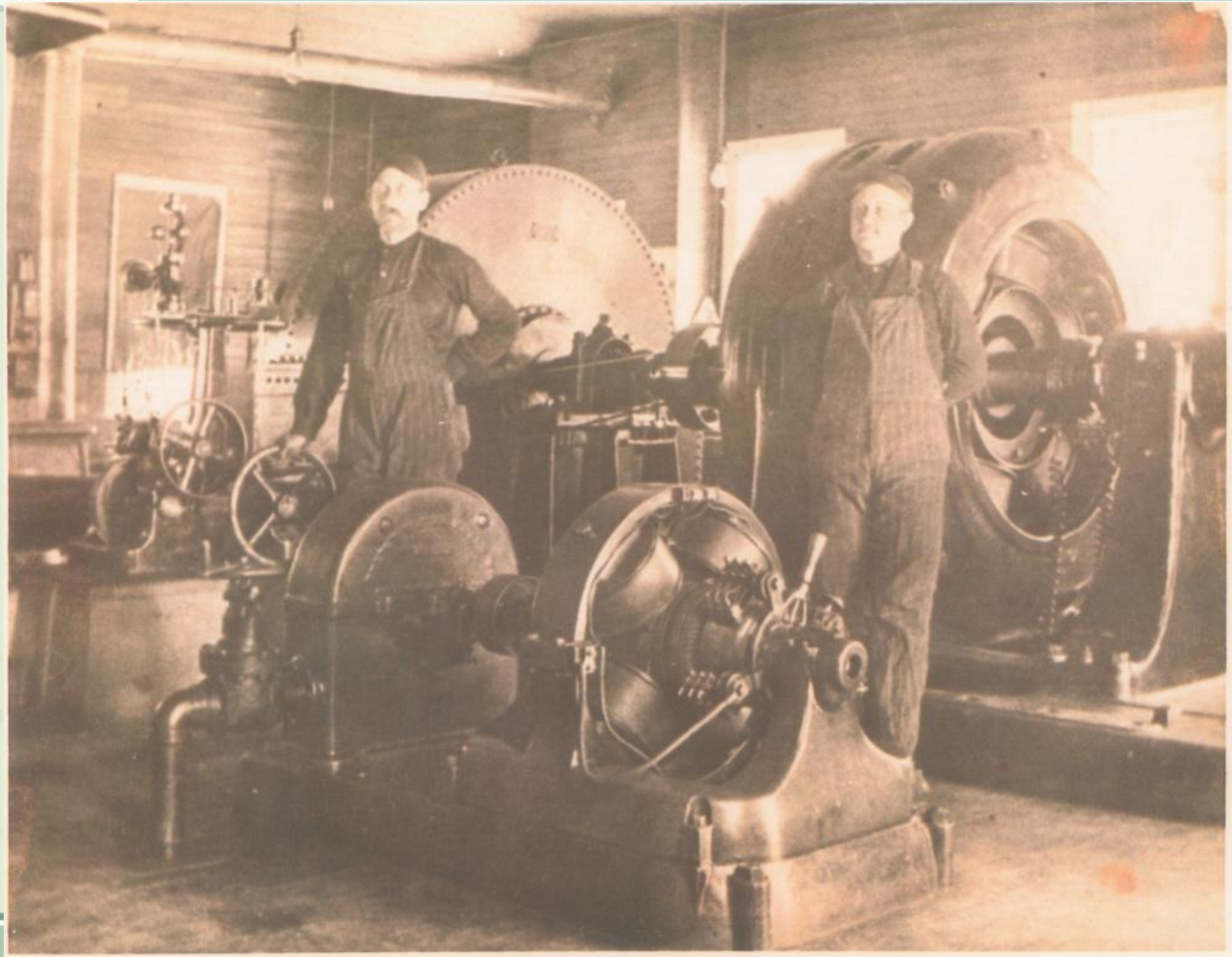

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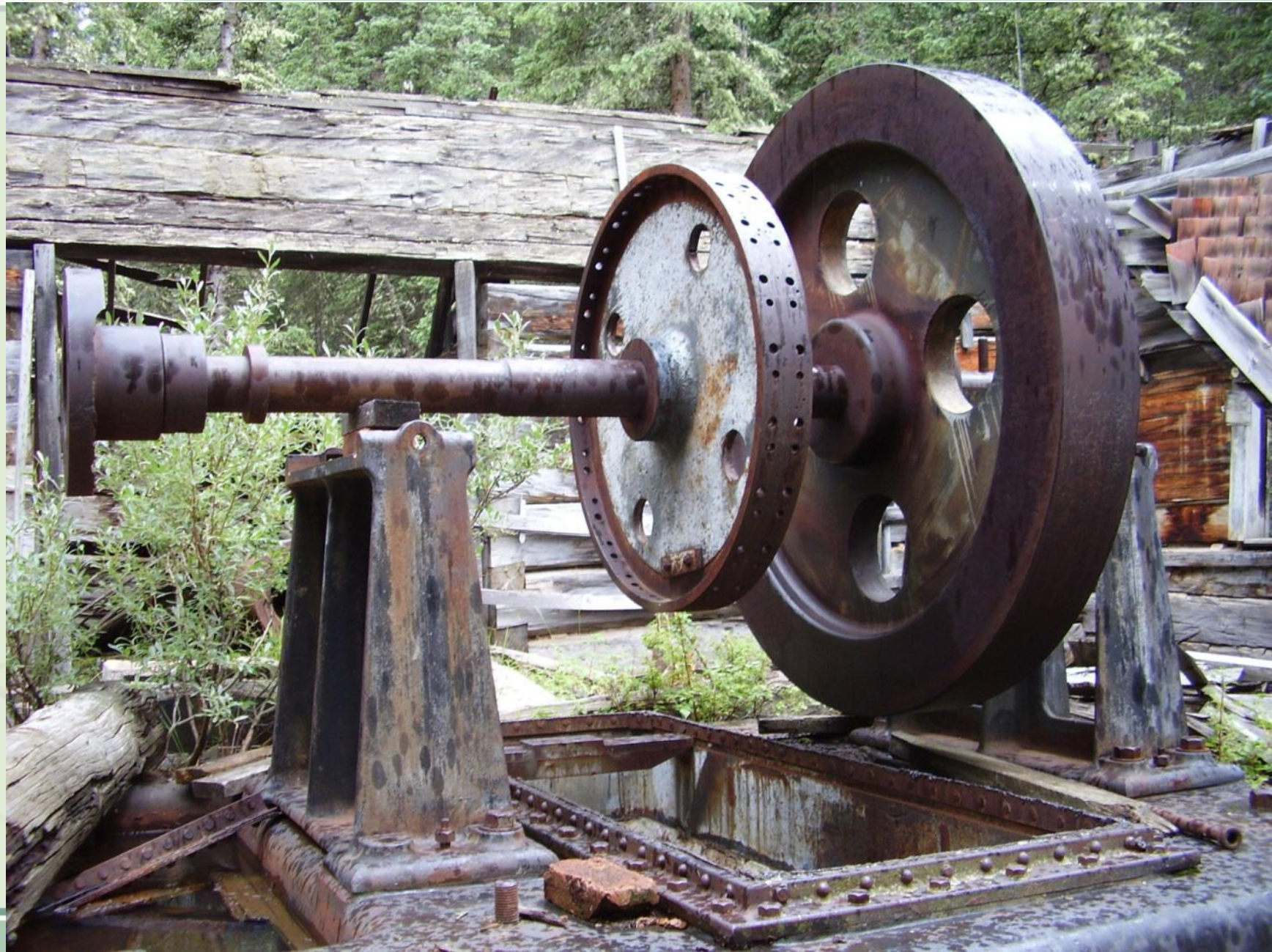


The Pelton Turbine

1848 Gold discovered at Sutter's Mill in California

1877 Lester Allen Pelton experiments with turbine designs

1880 Pelton patents his runner design

1883 Tests at the Idaho Mine in Grass Valley, CA – 90% eff.

1888 Pelton Water Wheel Company formed

1899 Ellipsodial Bucket improvement by Abner Doble

The Pelton Turbine is now a generic term used to describe hydro impulse turbines by any builder.

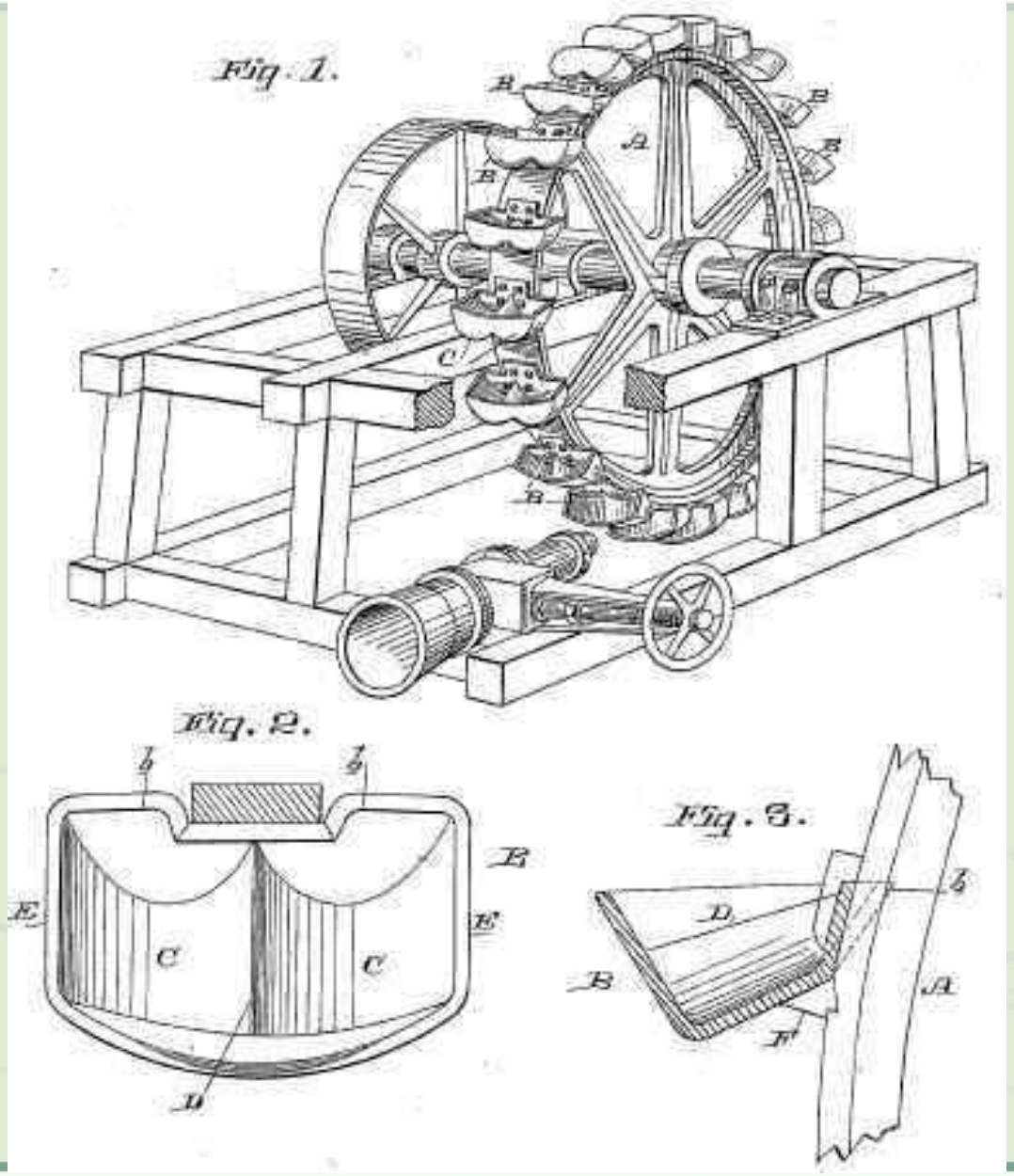
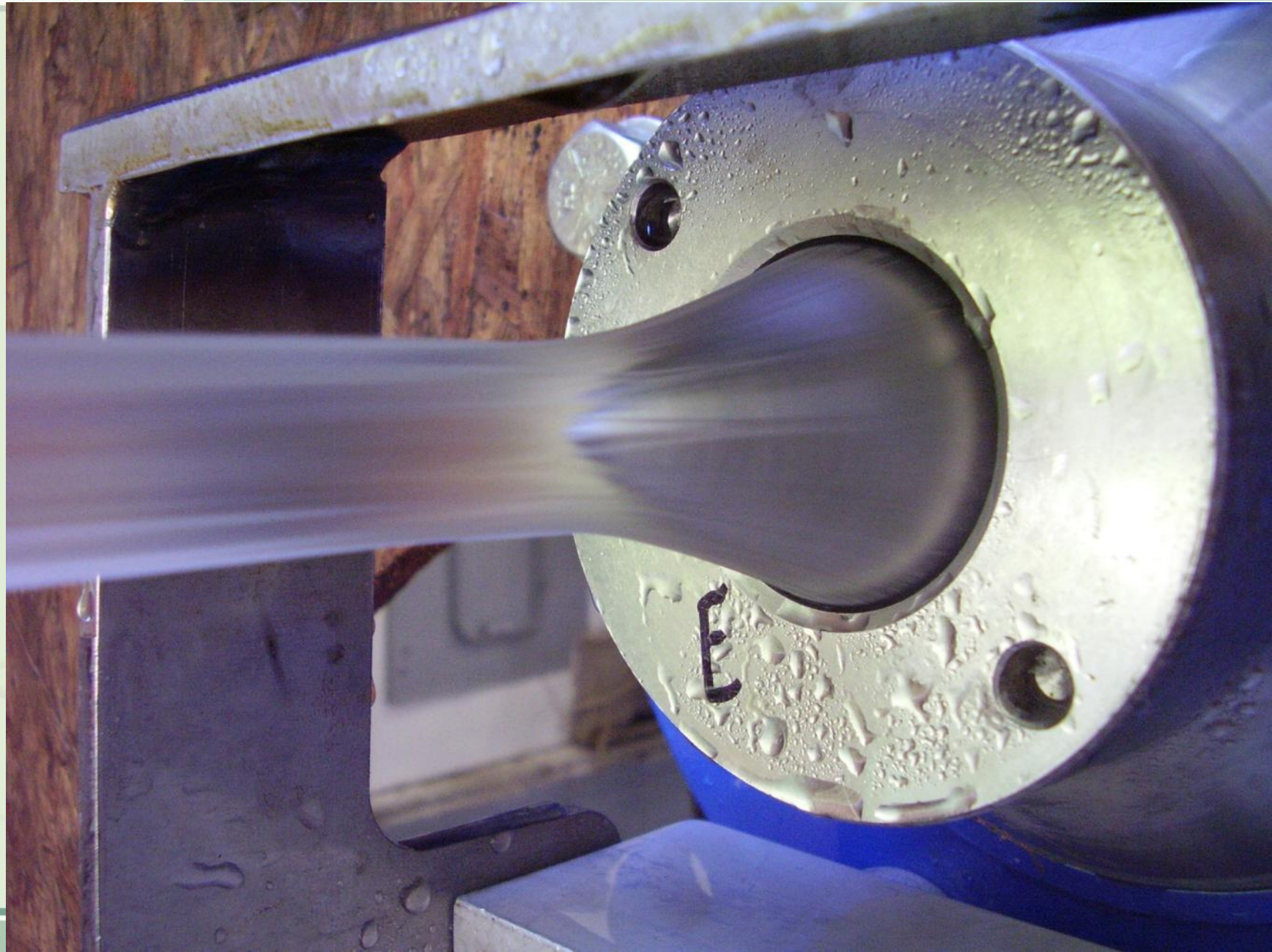


Fig. 1.
Fig. 2.
Fig. 3.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Minnehaha Hydro Plant

Built in 1898 by George Jackson, the Strickler Tunnel contractor to power the tunnel project.

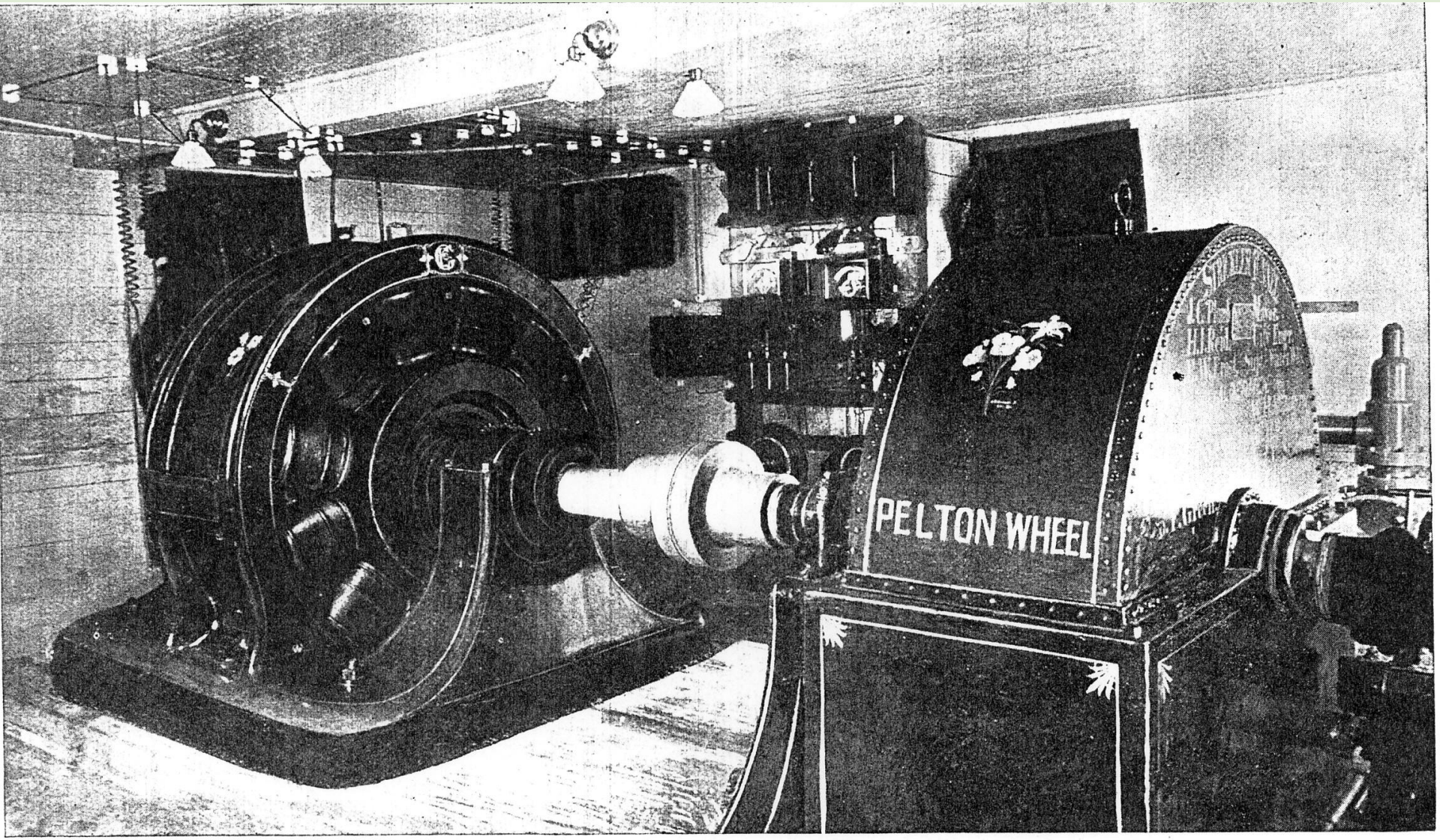
150kw, 60 Cycle, 3 phase, driven by a Pelton Turbine.

Abandoned in 1907.

Moved to Green Mountain Falls in 1911.

Abandoned in 1931.

PEAK POWER CO



MANITOU TUNNEL POWER PLANT, COLORADO.

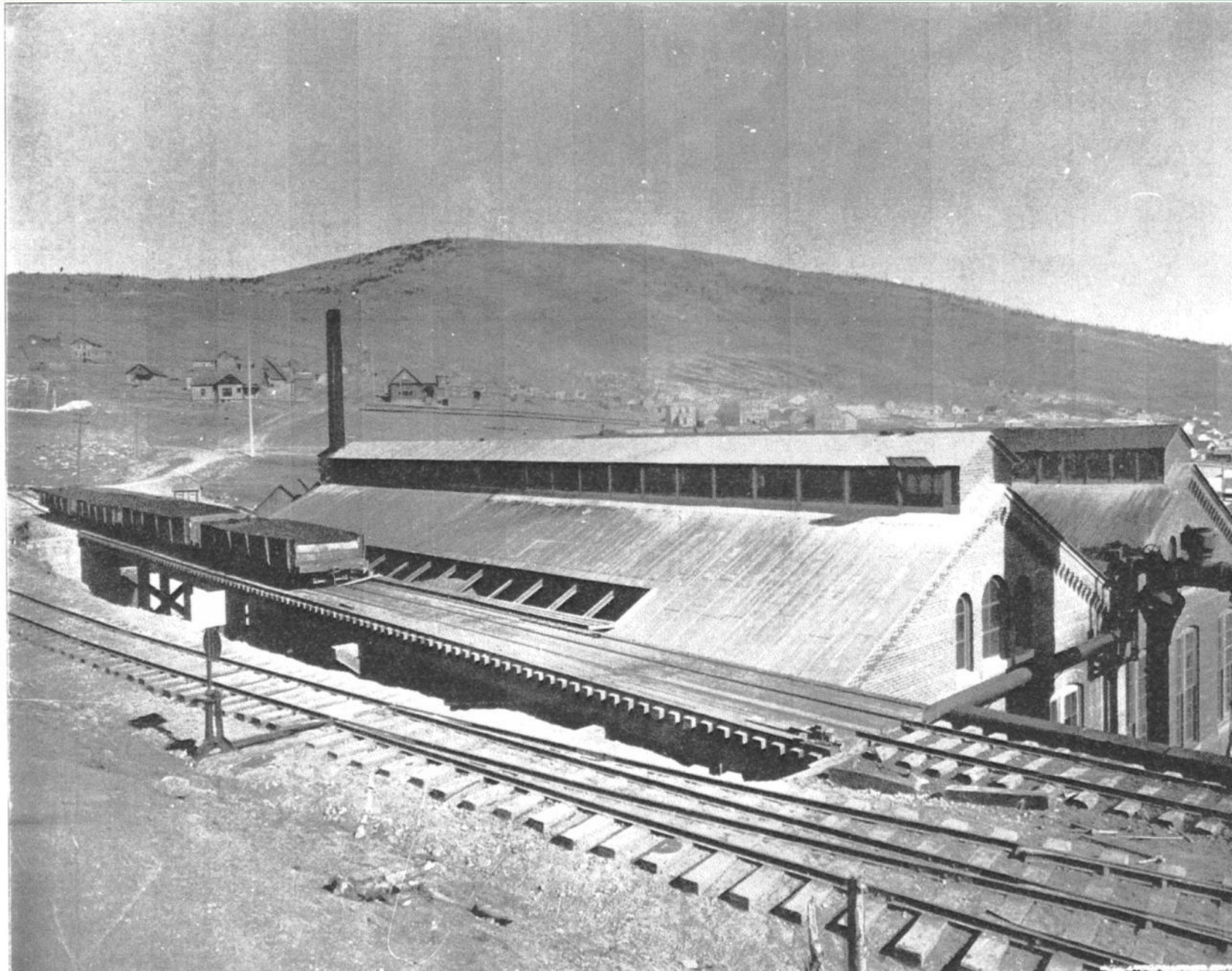
La Bella Mill, Water and Power Company

Built in 1898 by David Moffat to supply 30 cycle power, water and compressed air to the mines in the Cripple Creek District.

Very modern plant for it's day.

Could not compete with the less expensive Skaguay Hydro Plant, plus huge compressed air loss.

Torn down in 1920.



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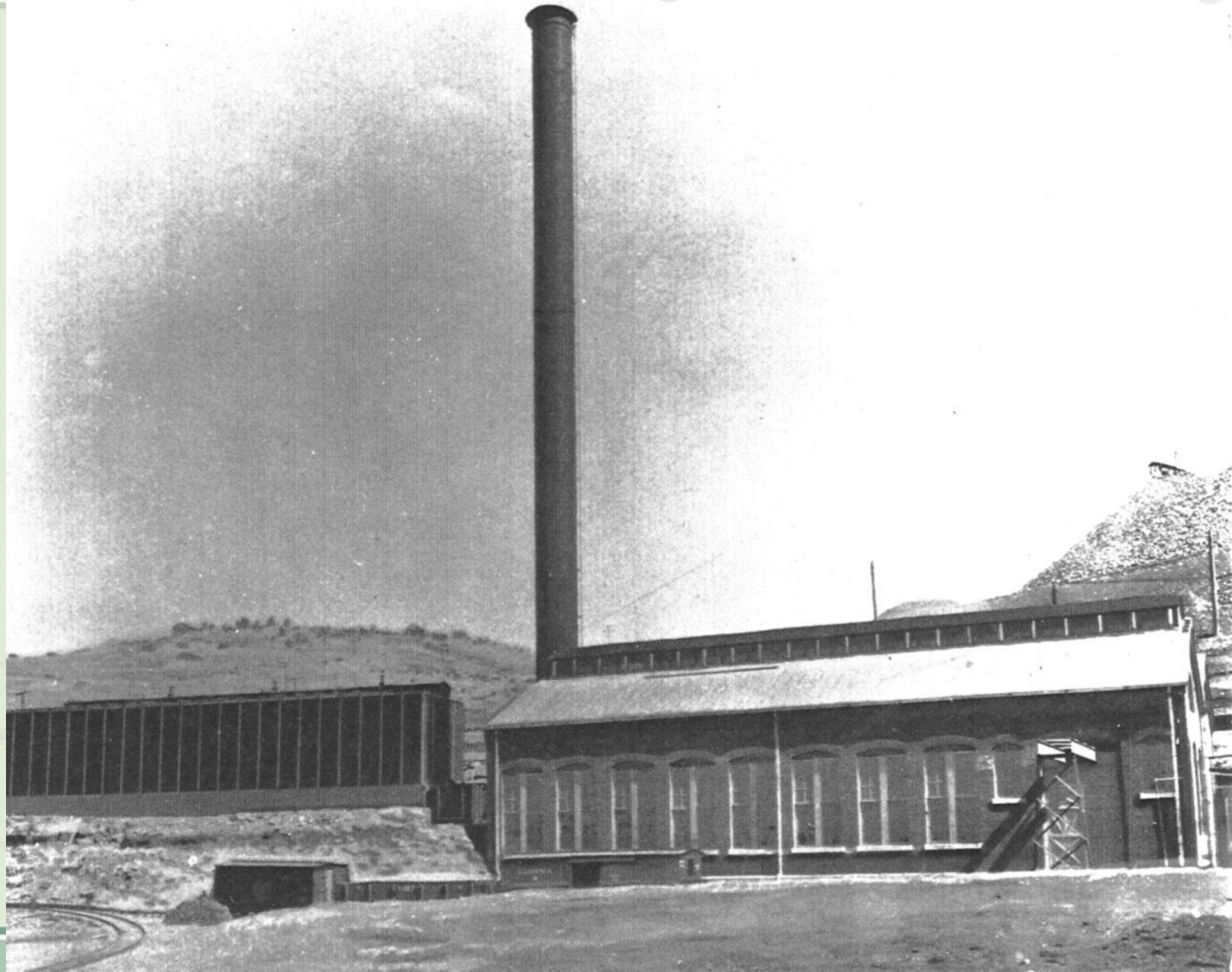

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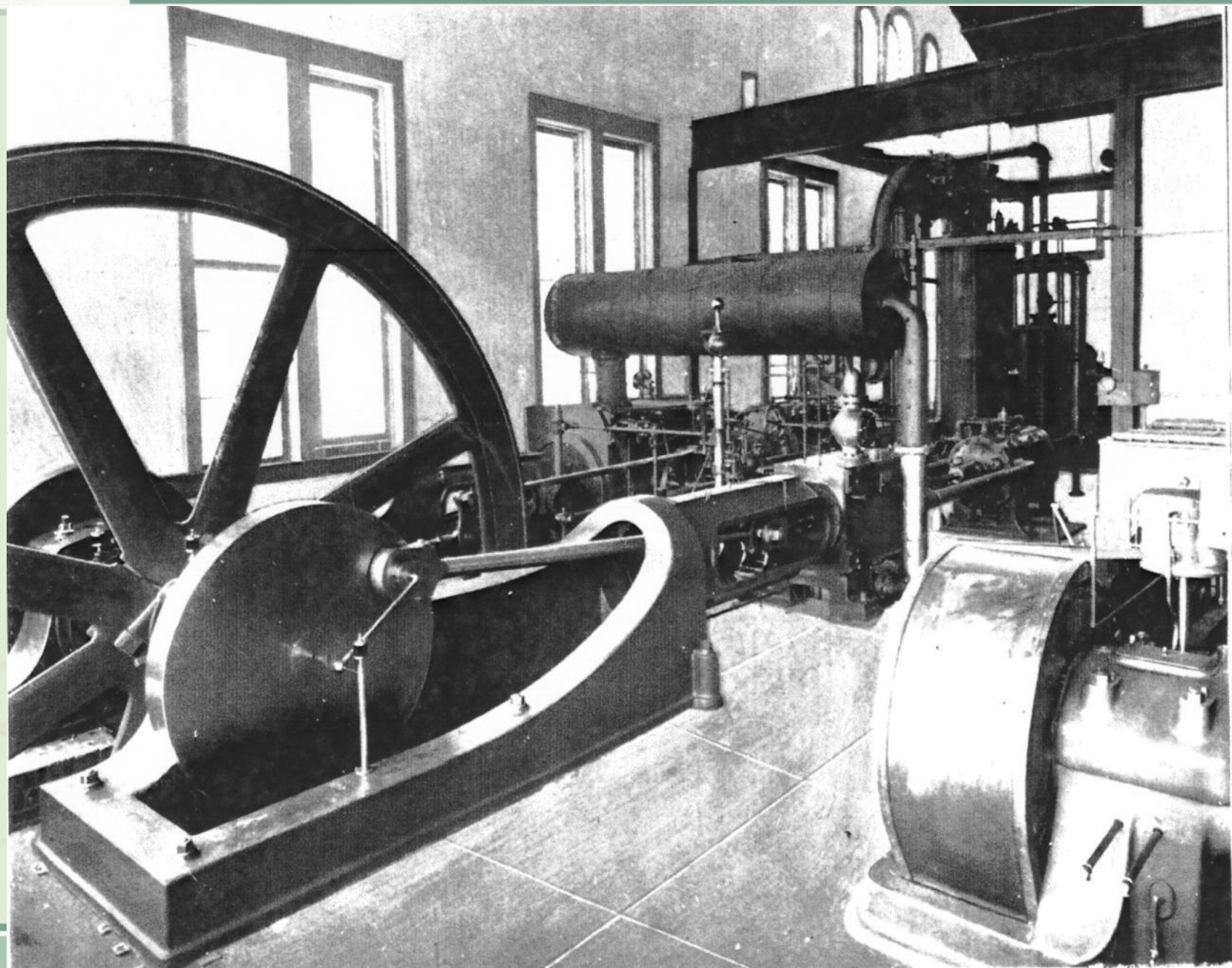

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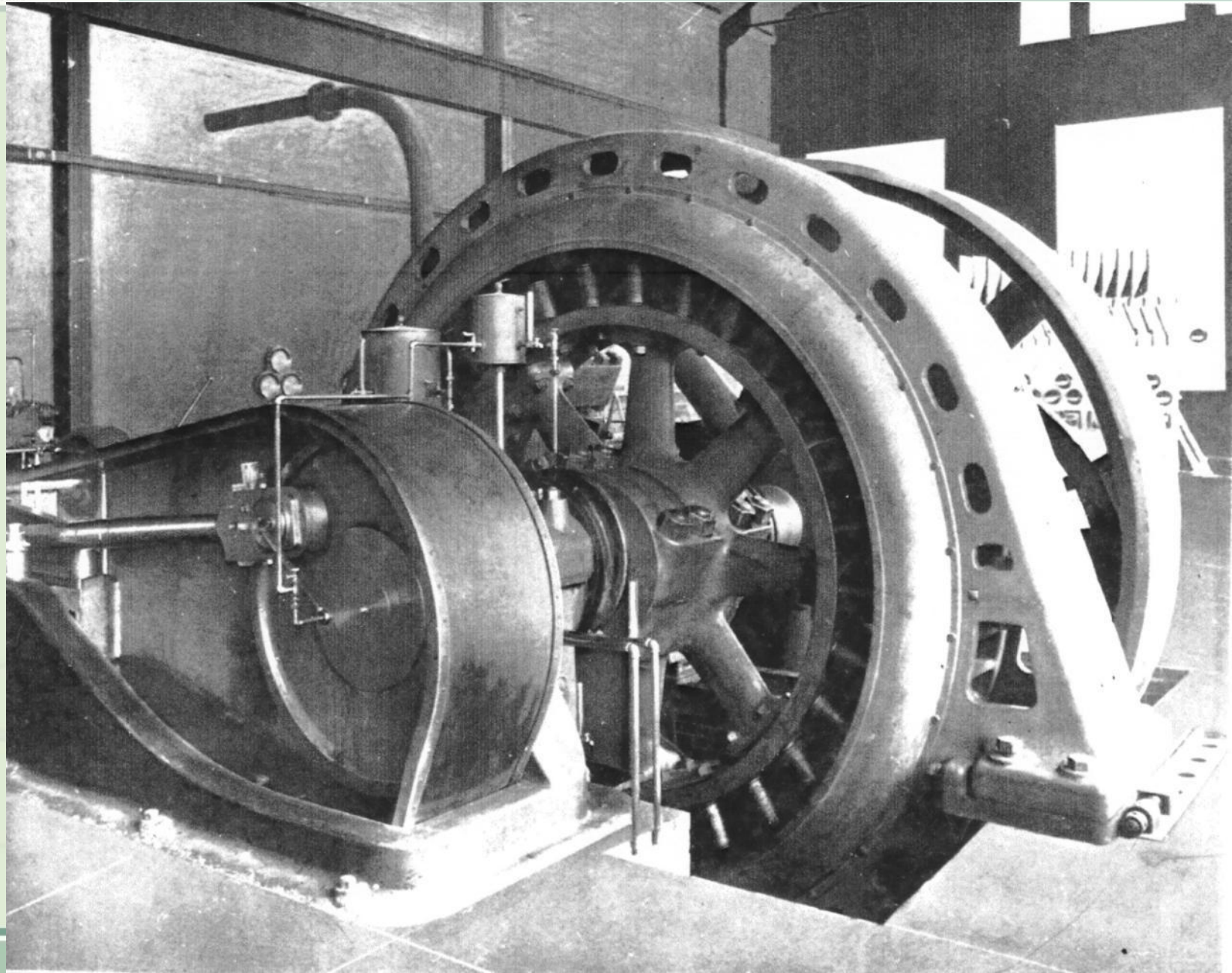

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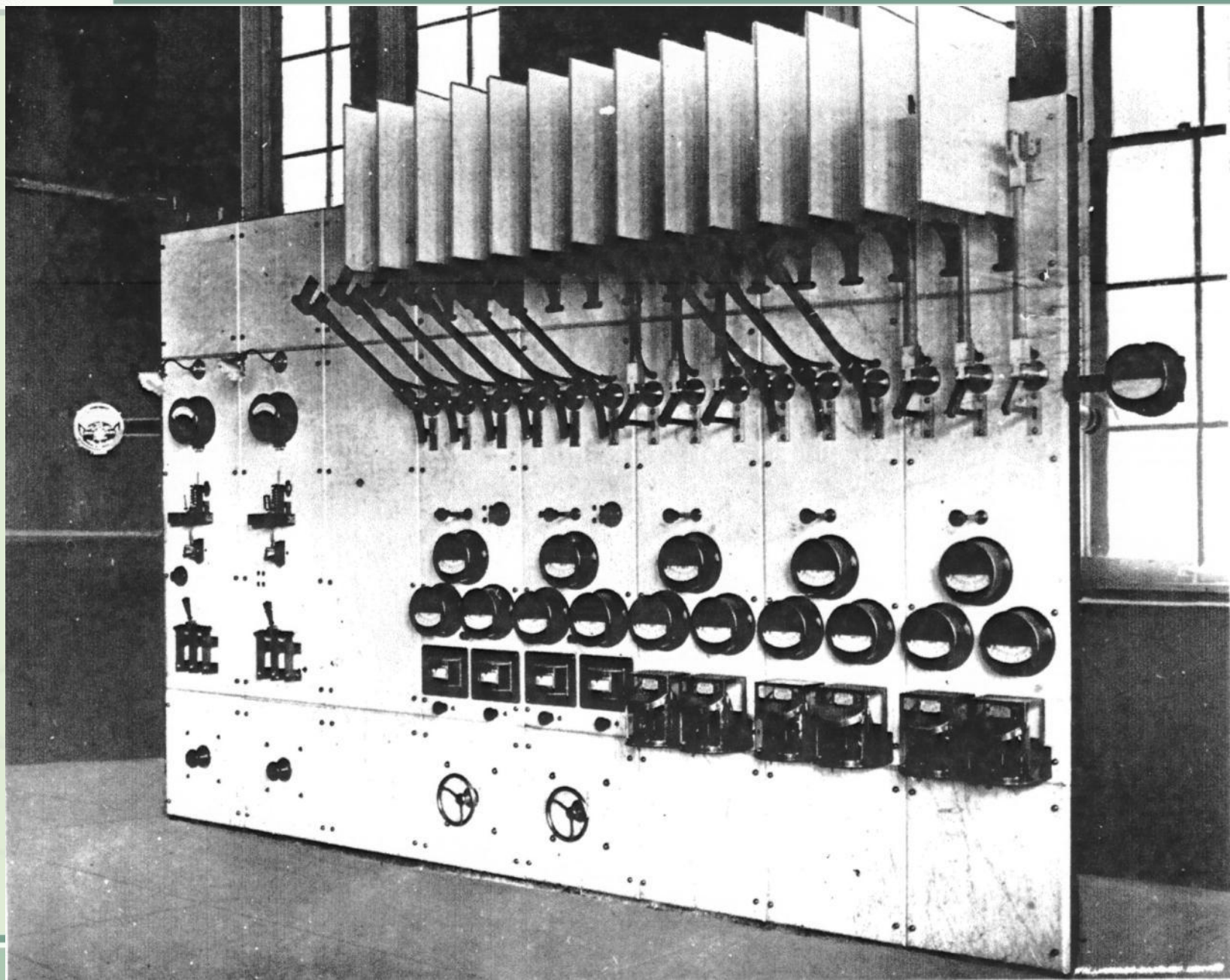

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Skaguay Hydro Plant

Built in 1900 by the Woods Brothers to supply 30 Cycle and 60 Cycle power to the Cripple Creek District.

Designed by R.M. Jones, who designed many hydropower projects in the West.

Four 30 Cycle units and two 60 Cycle units that were later removed.

Produced 30 Cycle power until 1965 when it was abandoned because of a flood.

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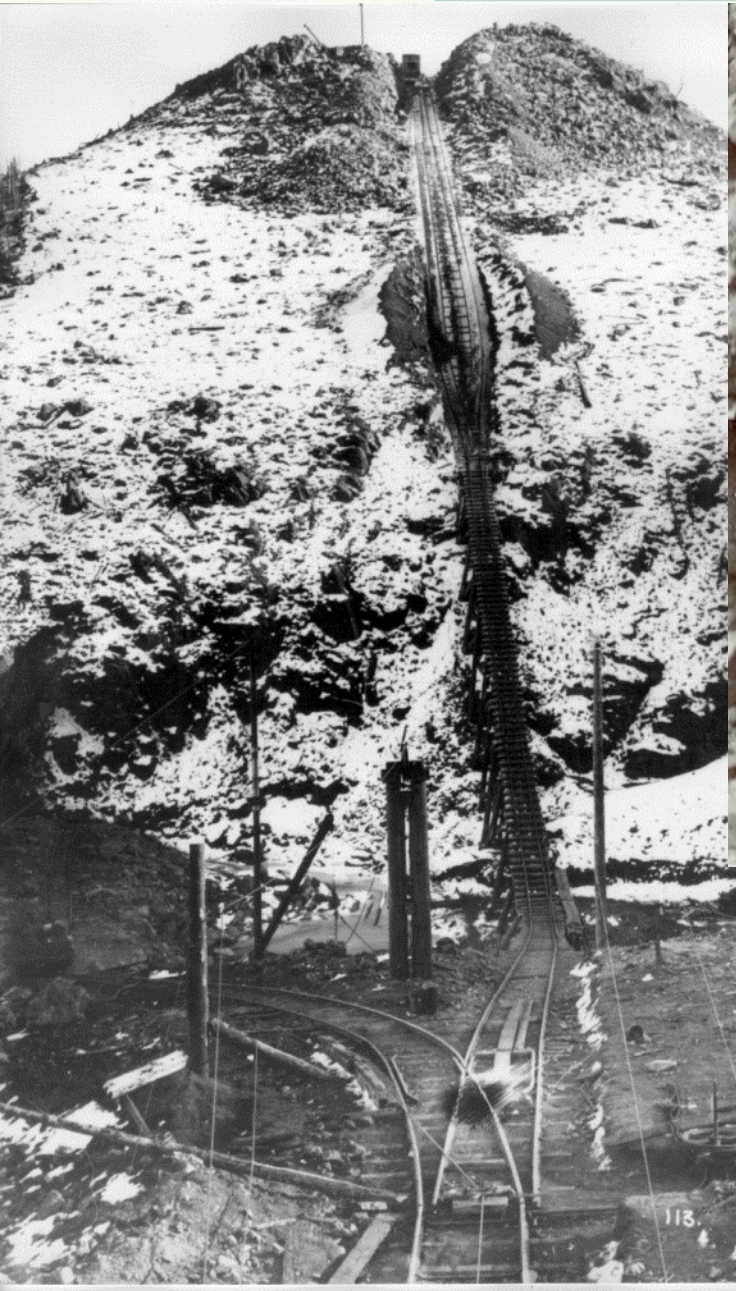

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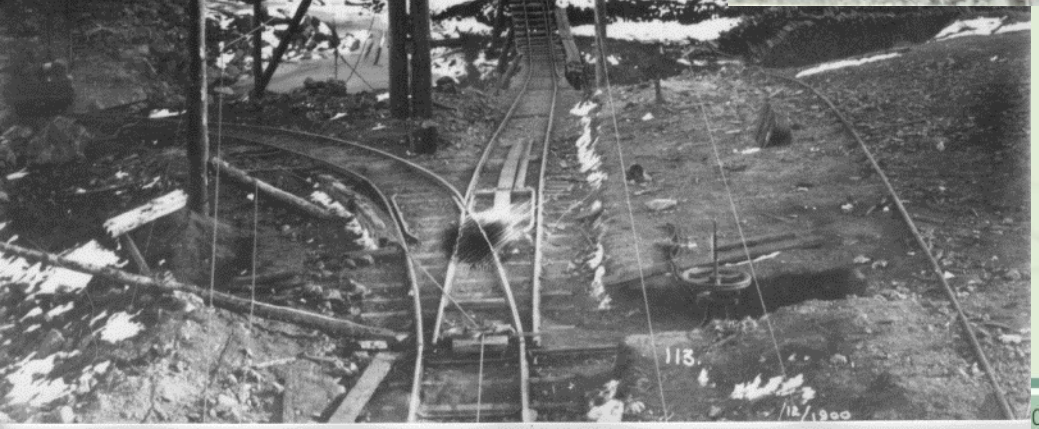

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Papeton Steam Plant

Built in 1900.

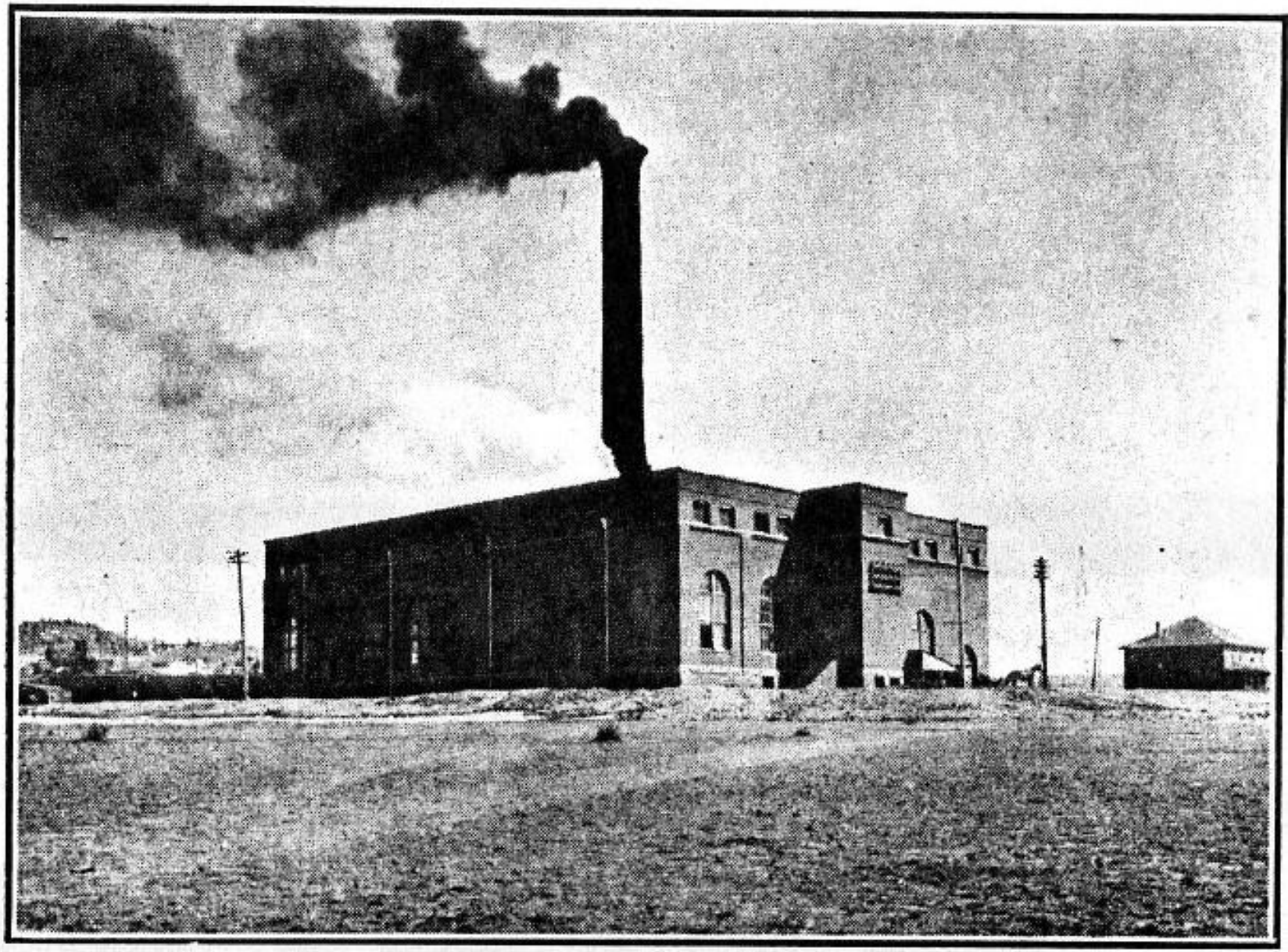
1,875kw from three Corliss Steam Engine Generators.

Fueled by Lignite from nearby City owned mines.

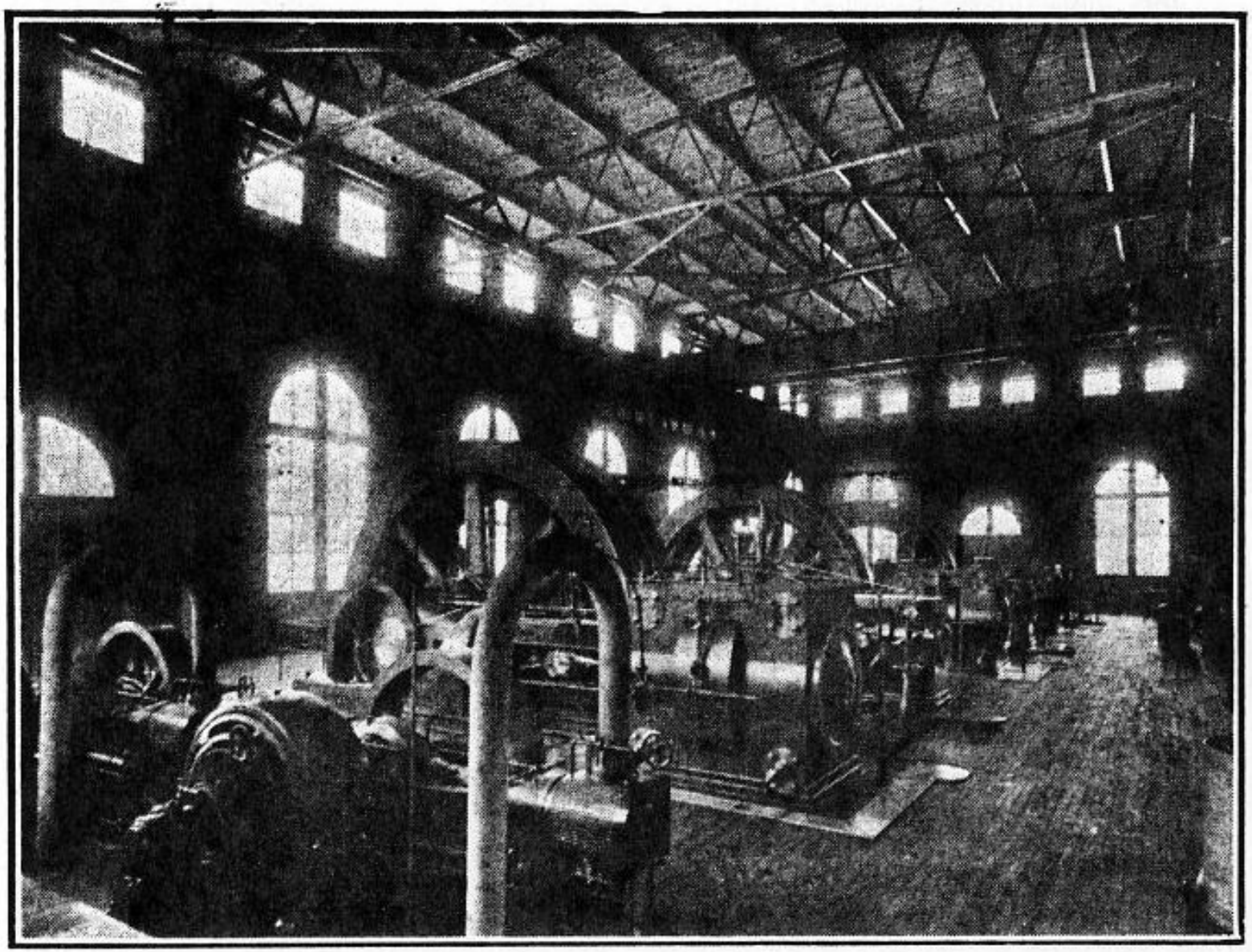
24 hour electric service.

Steam Turbine added in 1908.

Abandoned in October 1925.



EXTERIOR MAIN PLANT, AUSTIN BLUFFS.



INTERIOR MAIN PLANT, AUSTIN BLUFFS.

Colorado Springs Interurban Railway Power Plant

Built in 1909.

Produced 600 Volt DC power to operate the Colorado Springs Streetcars.

Burned Lignite from area mines.

Also had a Arc Lighting generator.

Shut down in 1925.

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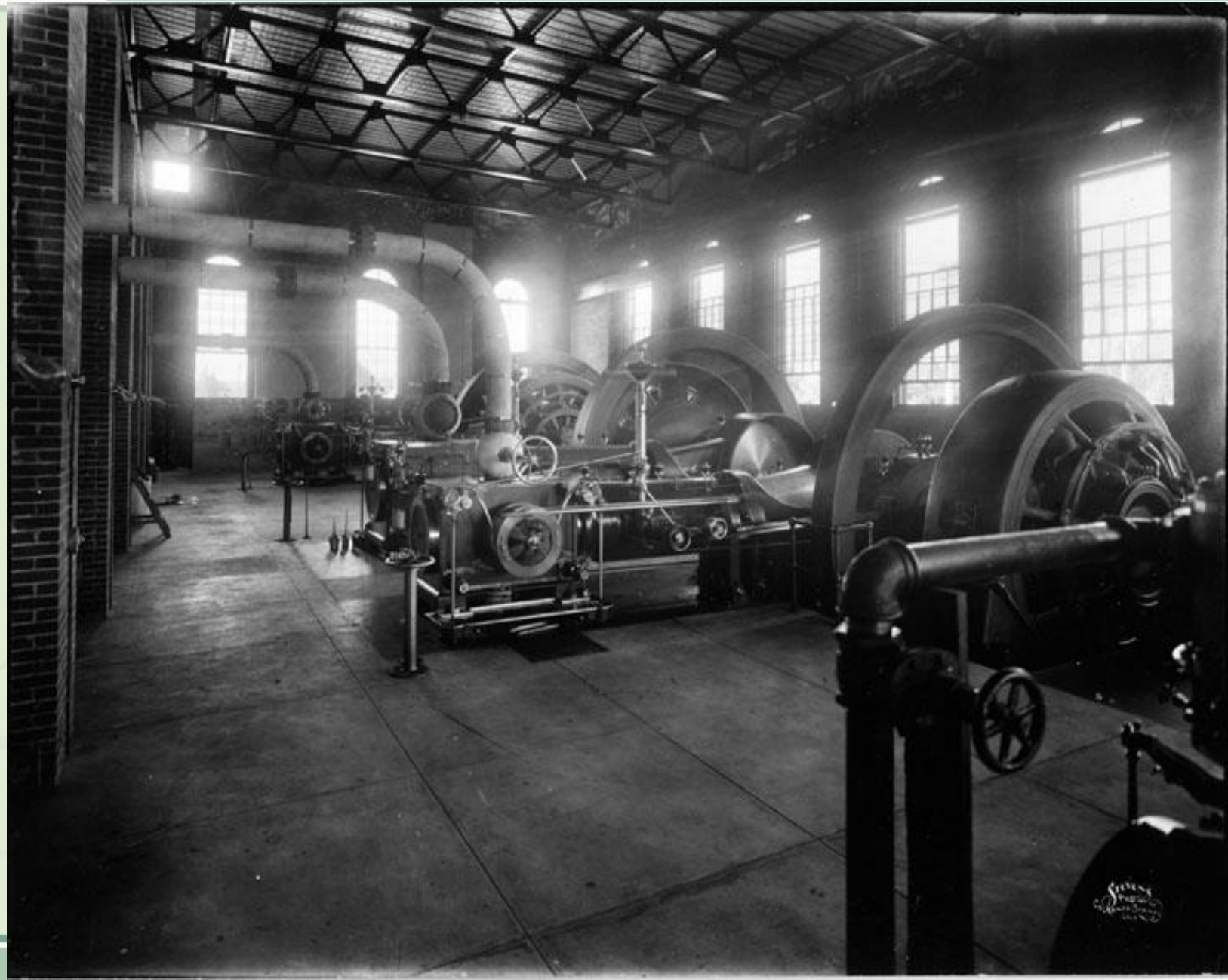


Manitou Hydro Plant

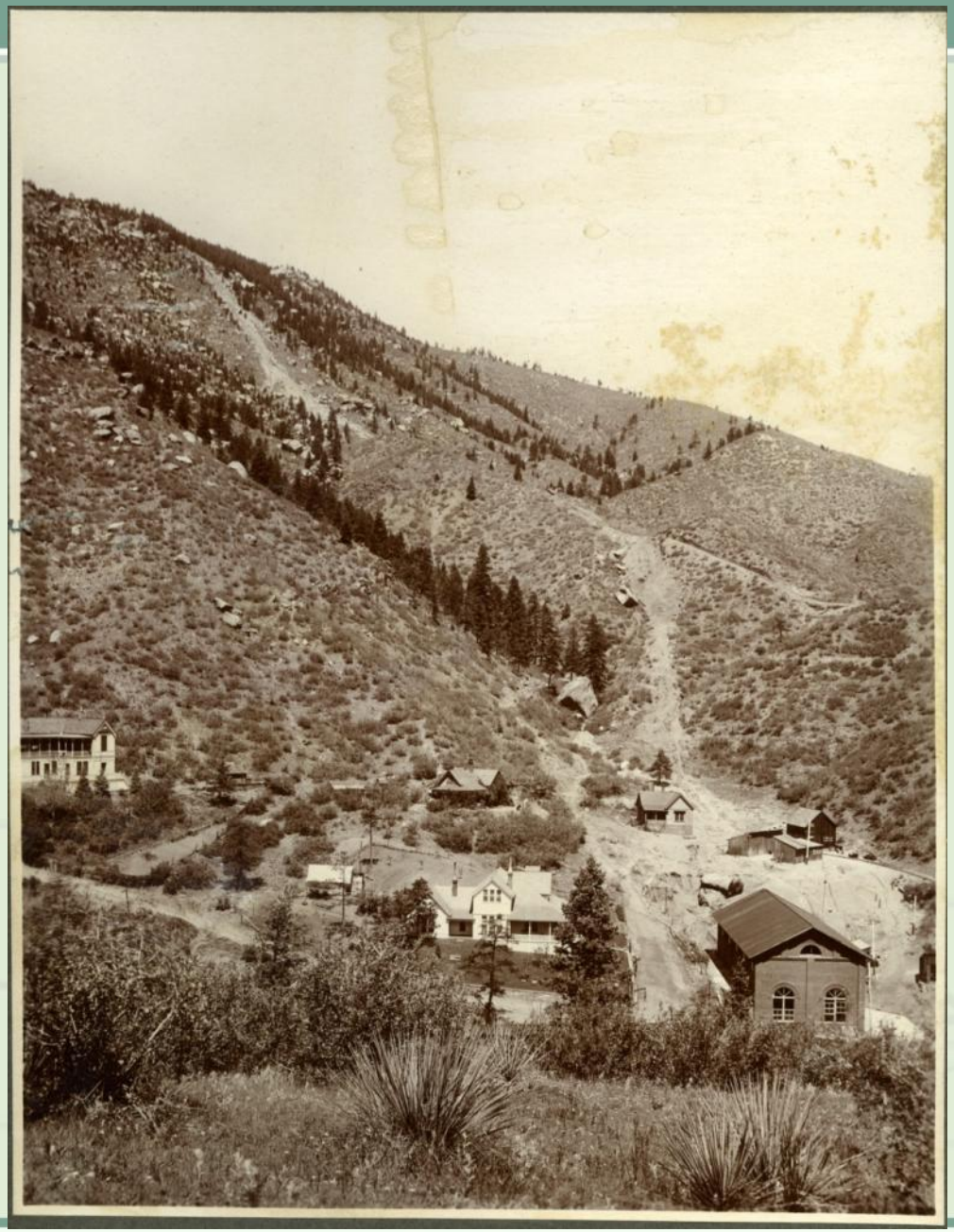
Construction began in 1903, on service February 1905.

Highest Head Plant in the world when built, one of the three highest head plants in America today, 2600+ feet of head, 1100 pounds per square inch.

Originally had three 750kw units.

The old units were replaced in 1927 and 1939 with two 2500kw units.

Unit #3 added in 2005.



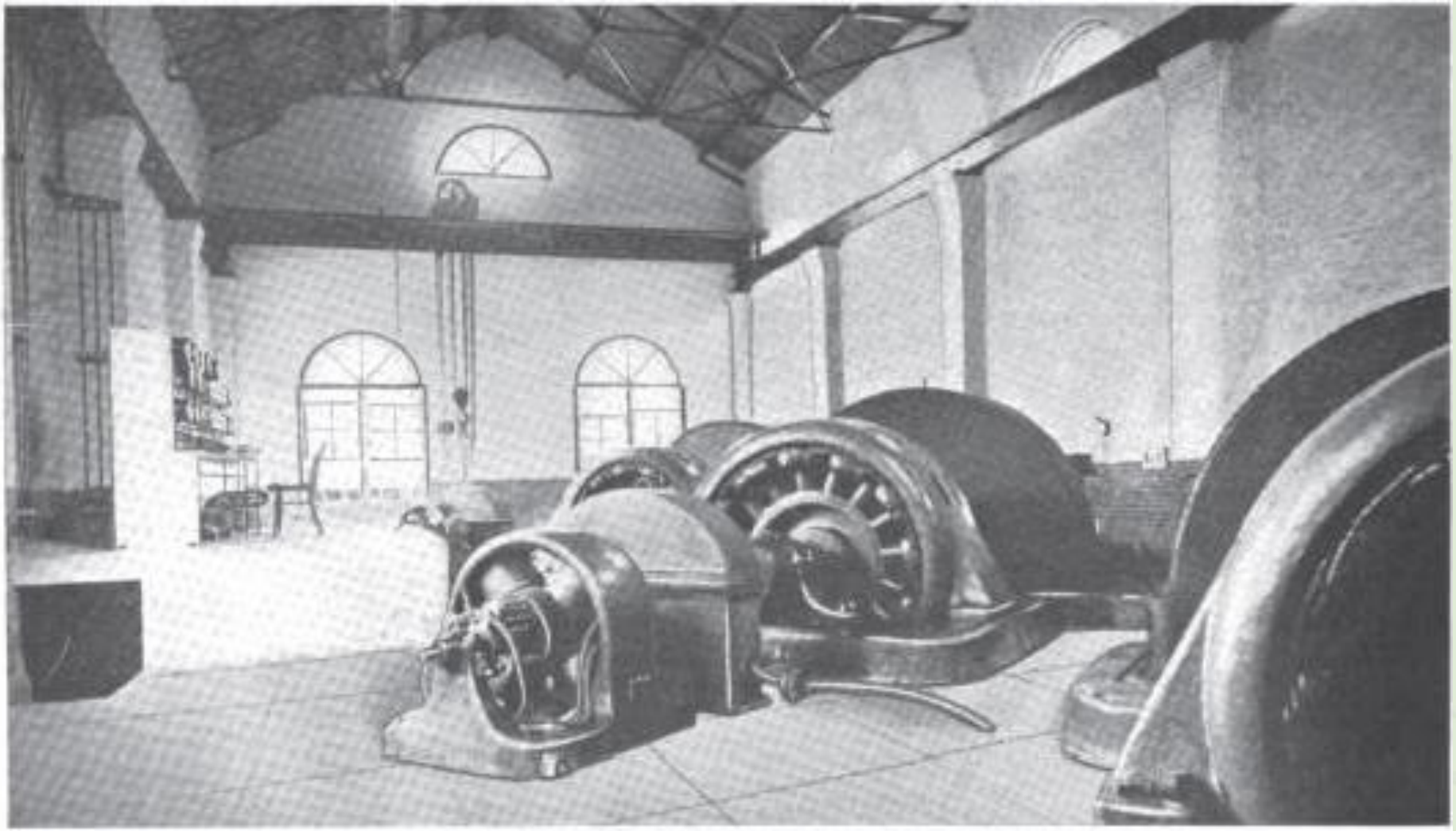
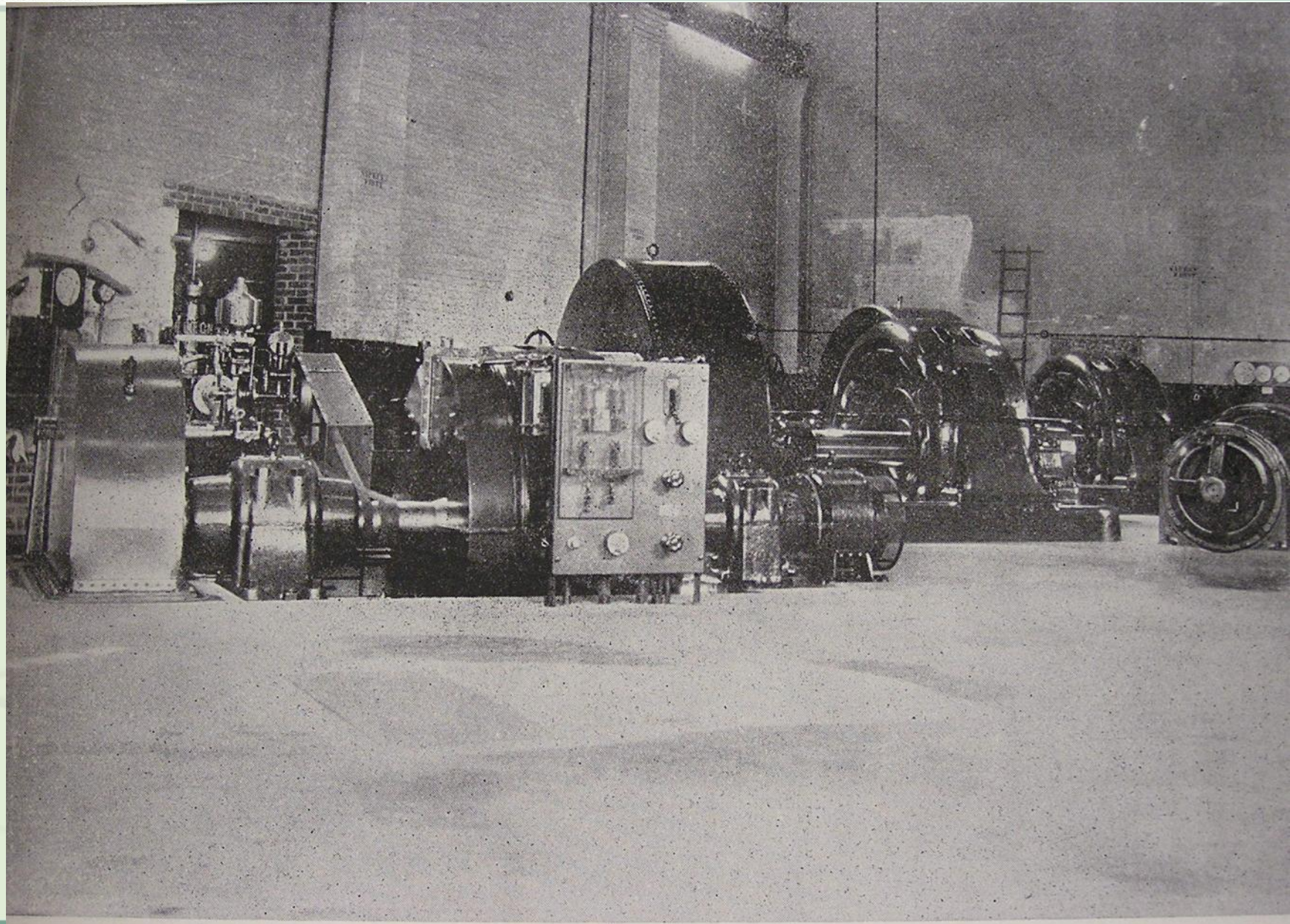


Fig. 8.—View of Interior of Power House.



Interior, Manitou Hydro Electric Station—Plant No. 2

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15238. Halfway Point on Mount Manitou Park Incline Railway, Manitou, Colorado

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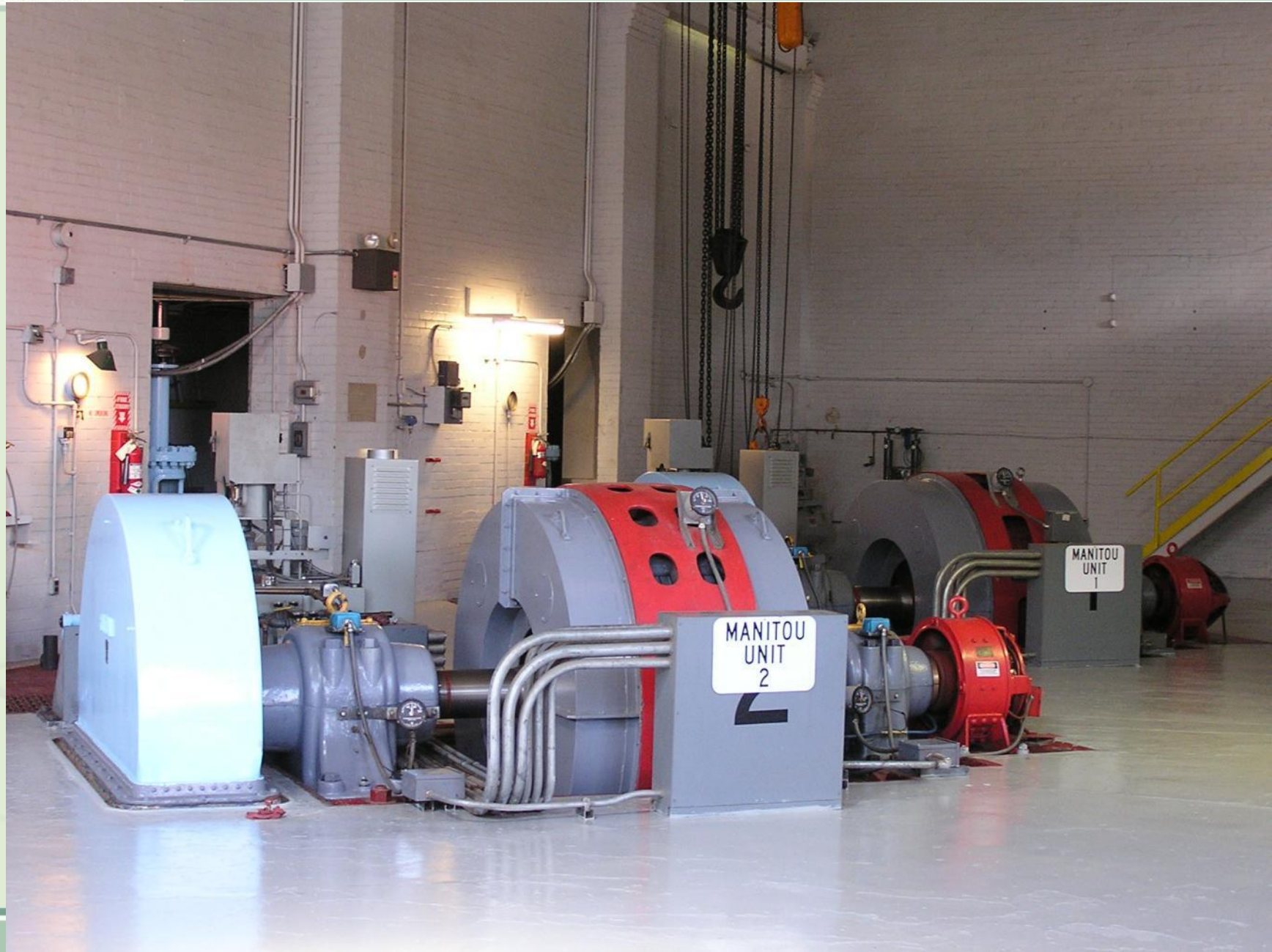

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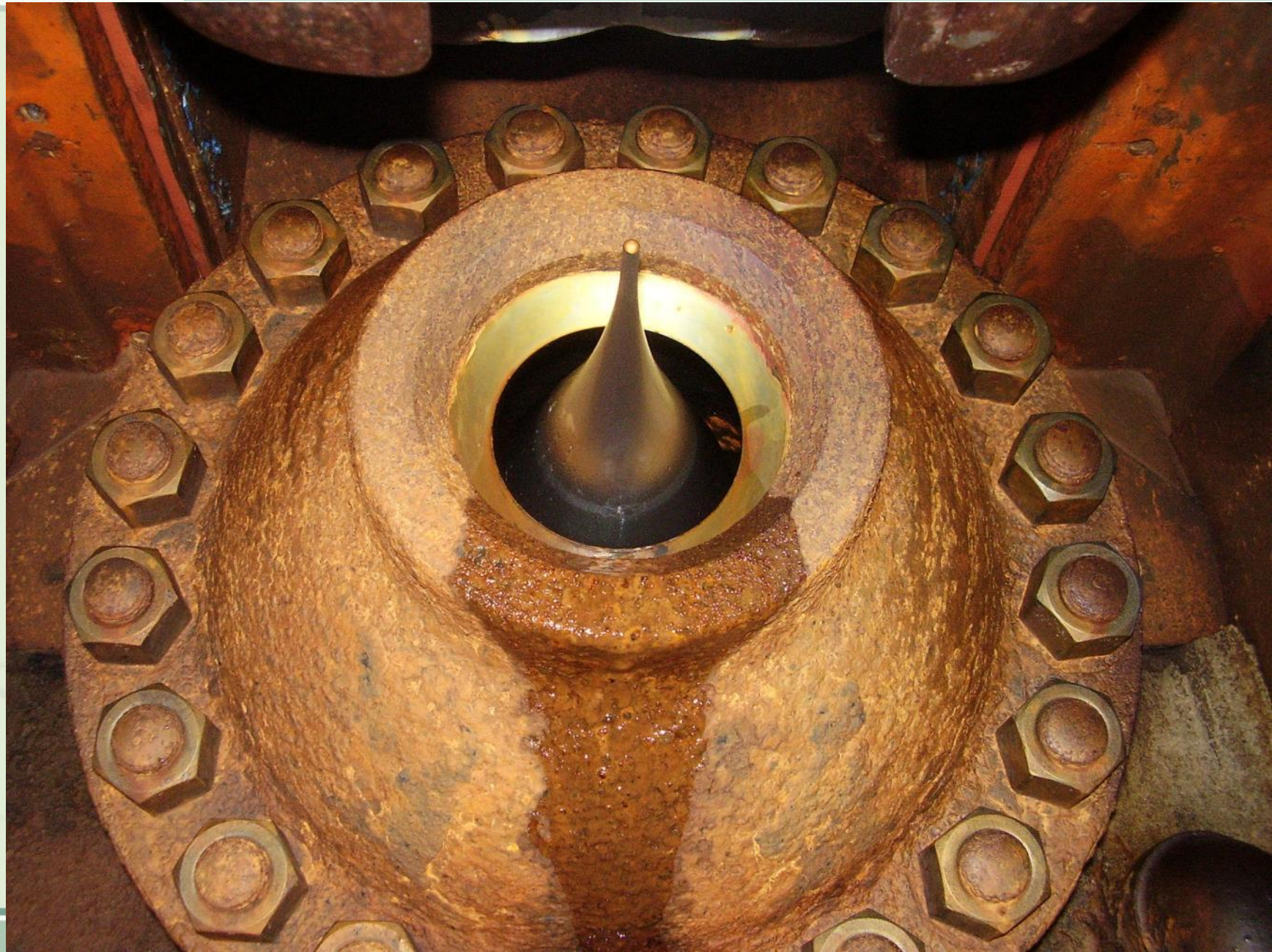

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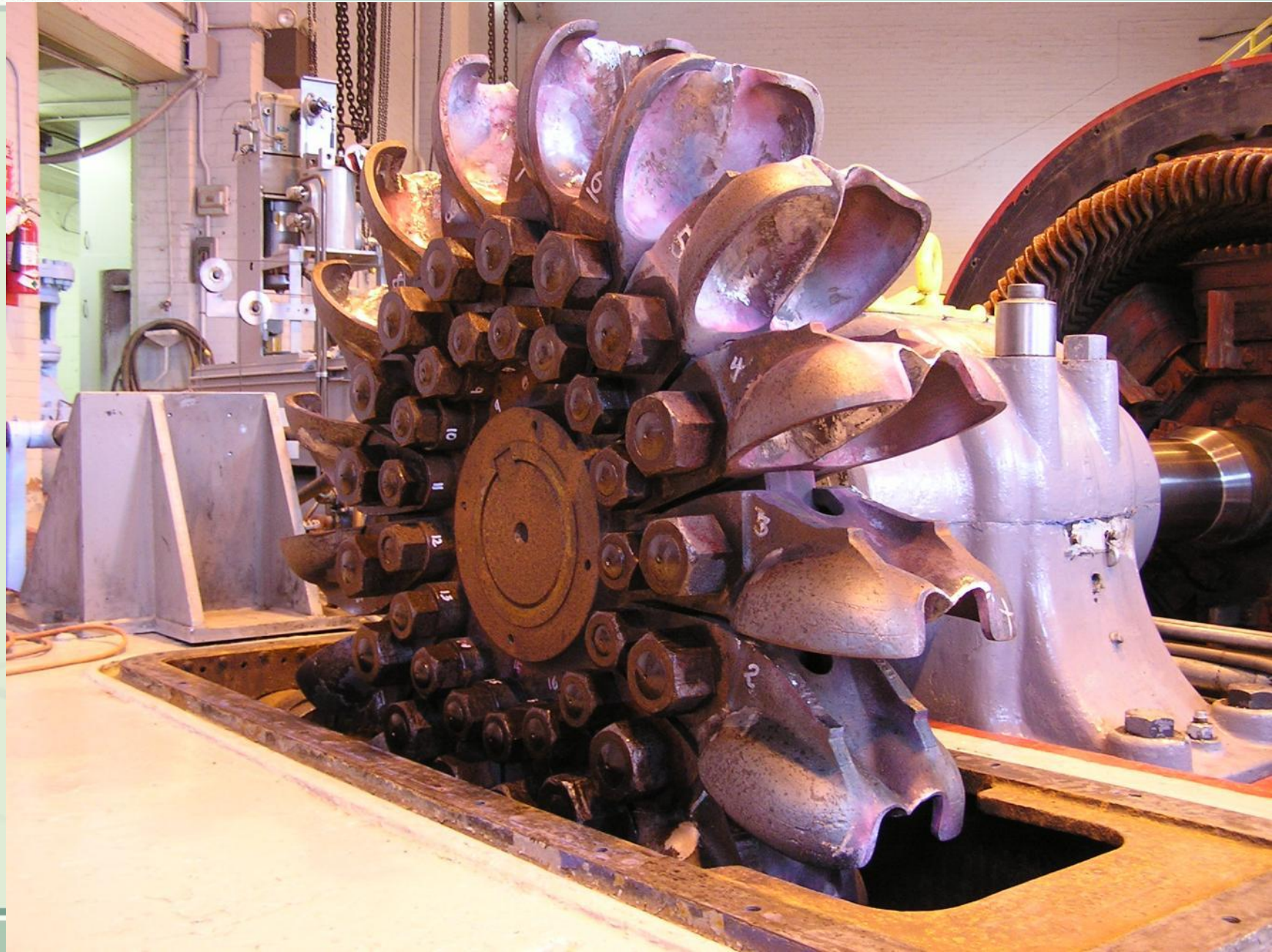

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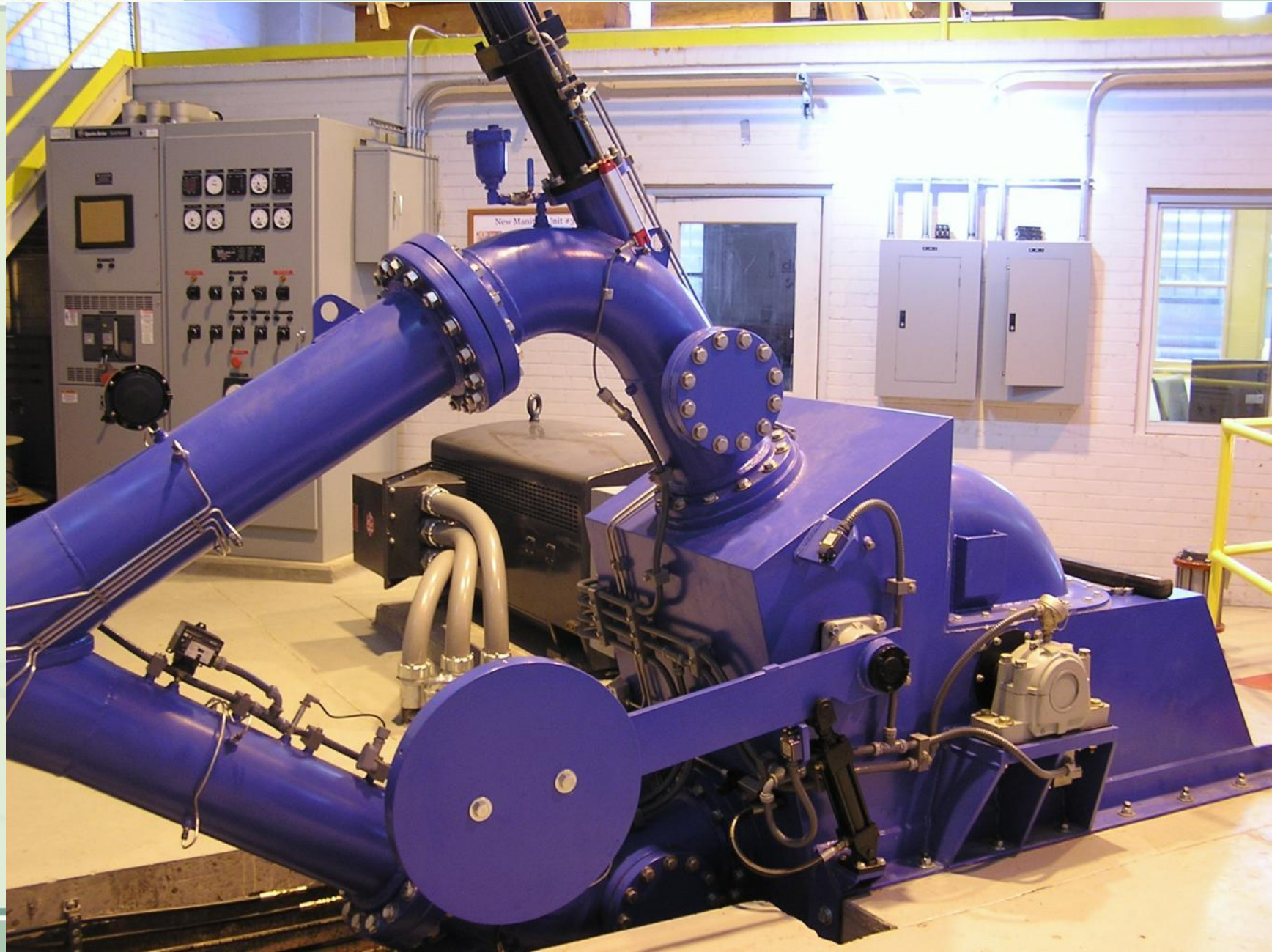

Glen Eyrie Powerhouse

Built in 1904.

Produced DC to power the entire Glen Eyrie Estate.

Originally had to tiny steam turbine/generator sets, but they were replaced with a steam engine/generator after an efficiency test.

Burned Lignite.

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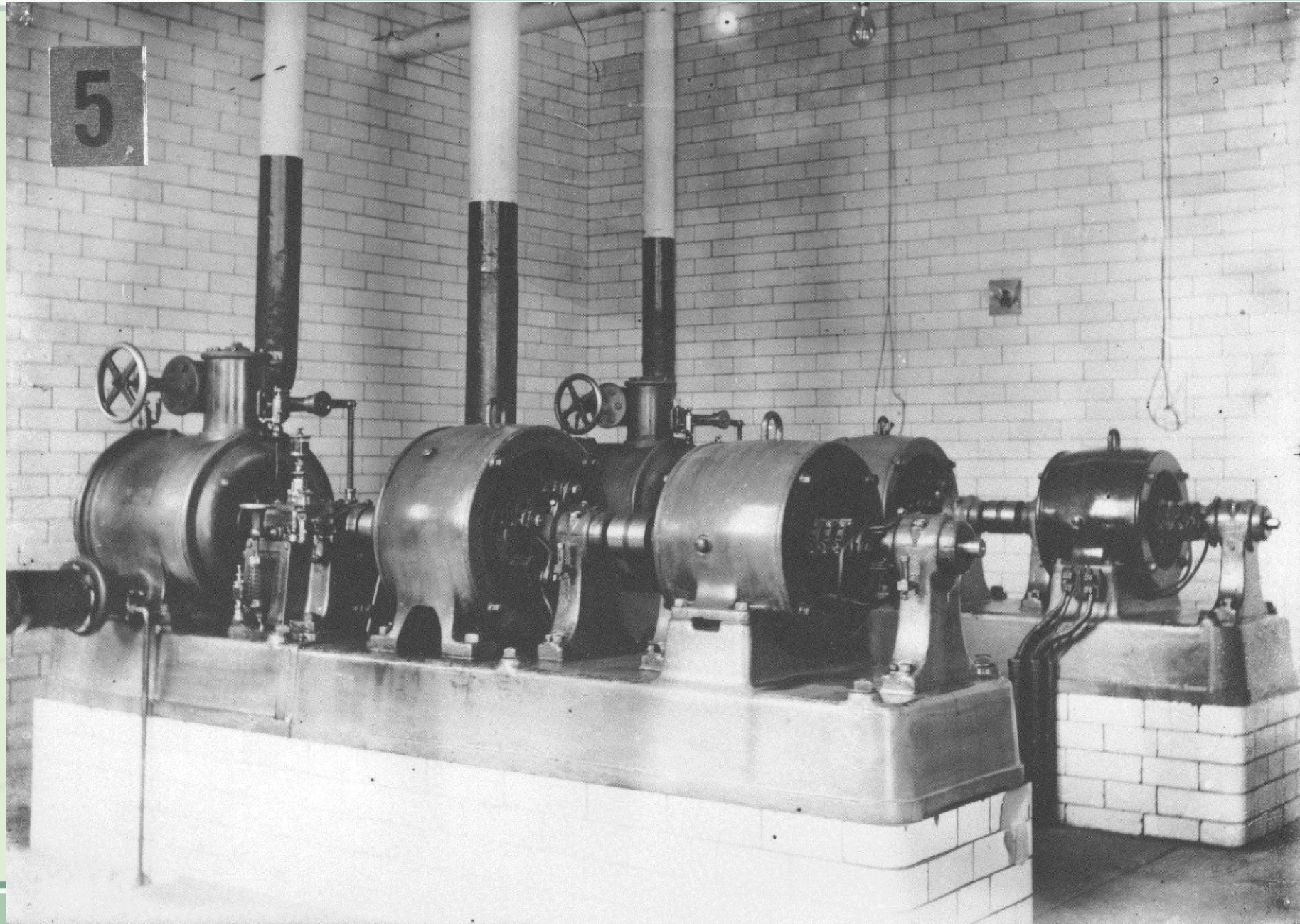
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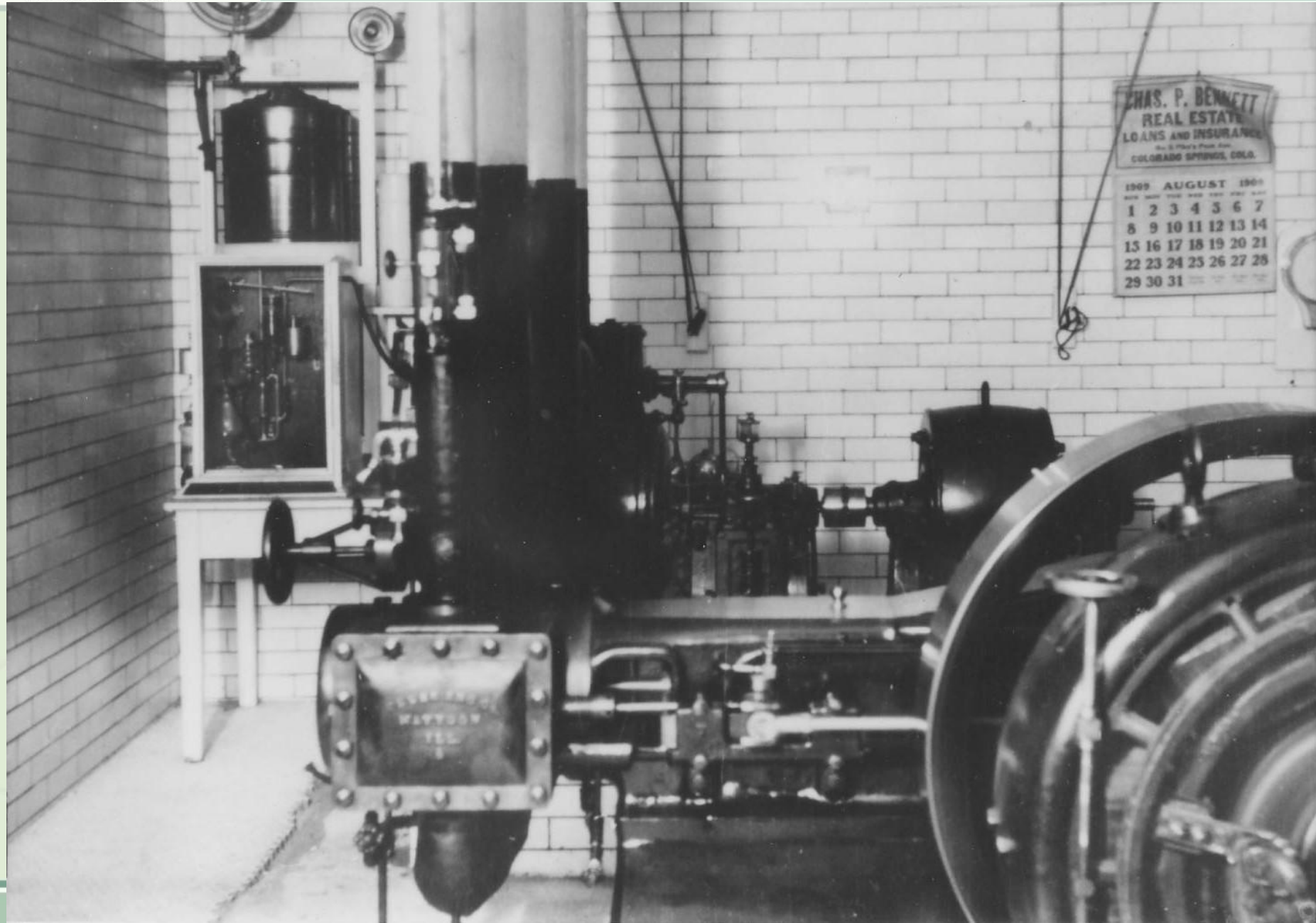

City Ownership

The Manitou Plant, Substation A, and the Papeton Plant all came under City Ownership, through a public vote, at Midnight June 30, 1925.

There were already plans in place to shut down some of the older plants and build some new plants.

New Steam Plant

Designed and built in1925 by Wood and Weber of Denver.

Originally three Lignite fired boilers, two Westinghouse 2500kw steam turbine generator sets.

New units added in 1932 (5MW), 1945 (5MW), 1949 (12MW), 1960 (55MW Unit #5), 1968 (85MW Unit #6), 1974 (142MW Unit #7).

Colorado Springs Steam Station. Plant No. 1

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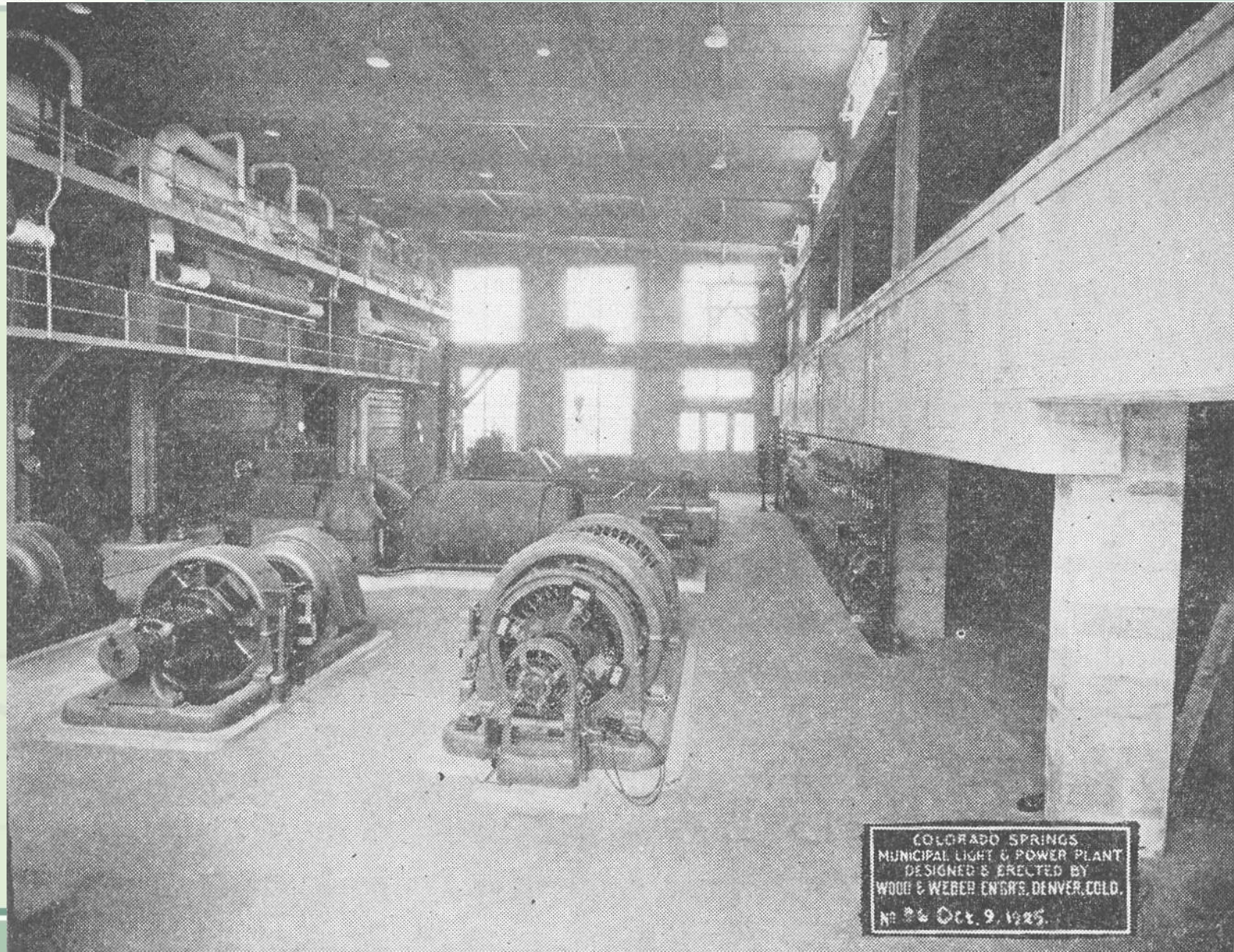

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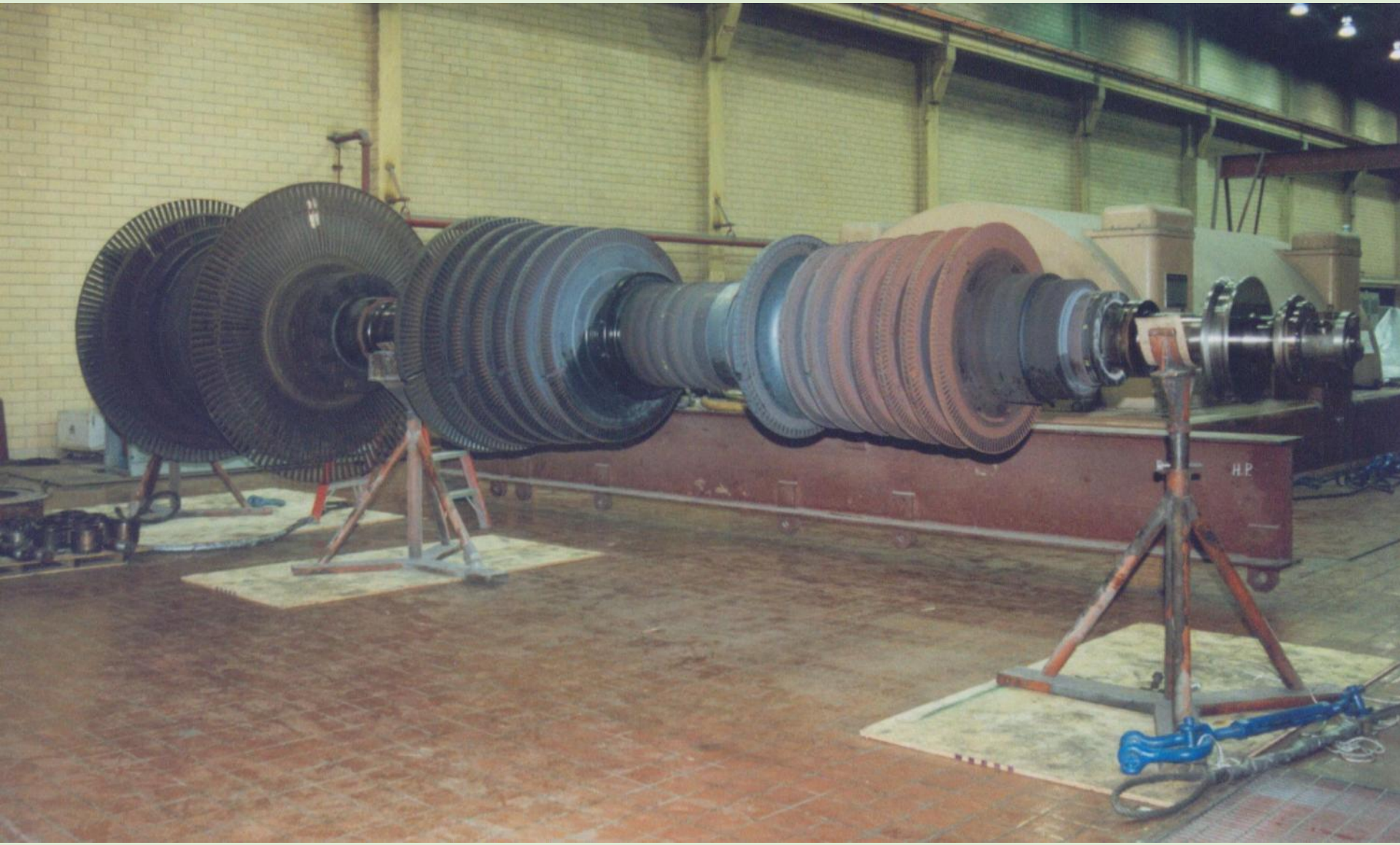
H.P.

Ruxton Hydro Plant

Designed and built in 1925 by Wood and Weber of Denver.

The entire plant and the 2.5 mile pipeline finished in 6 months.

First fully automated hydro plant in the world when built.

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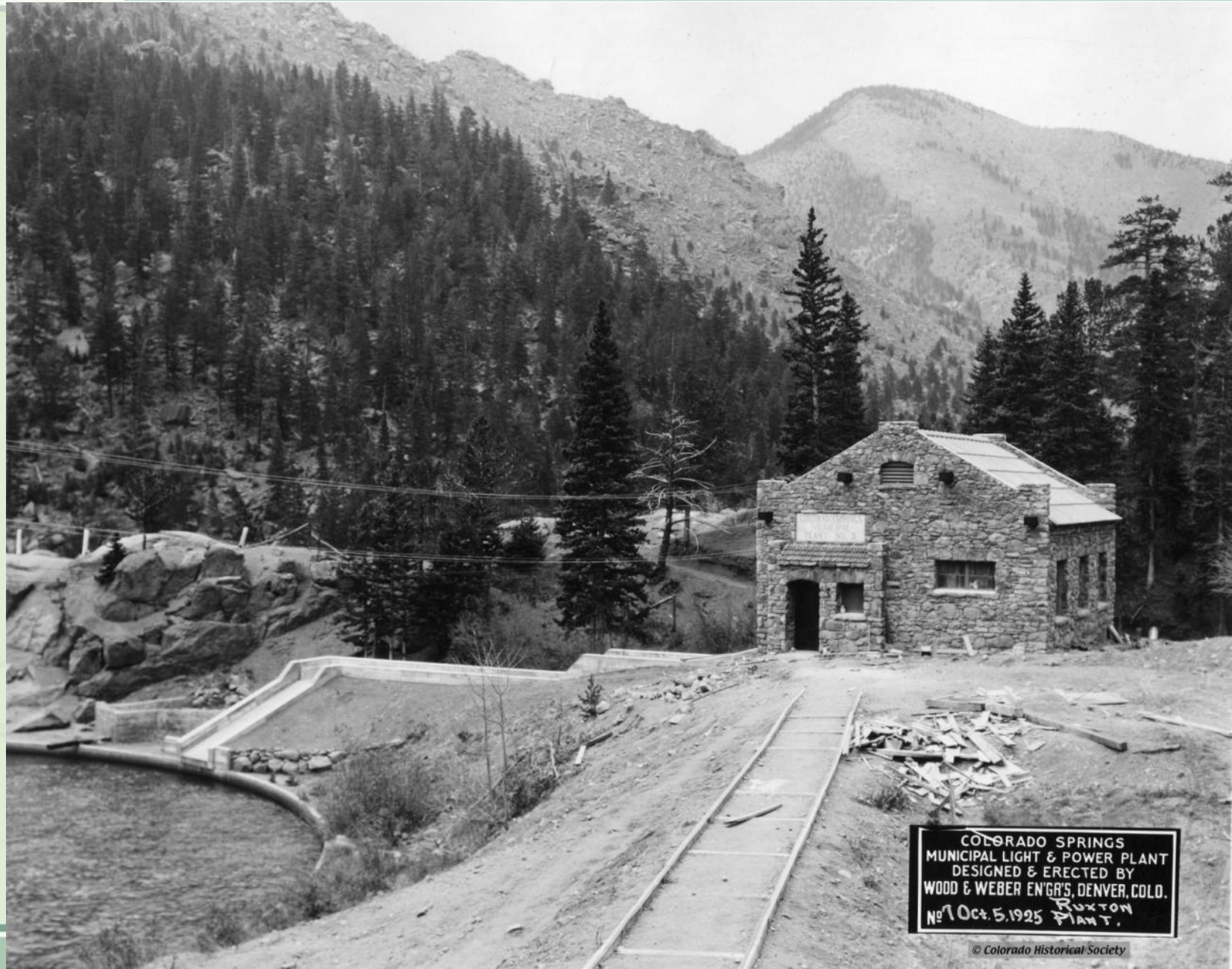

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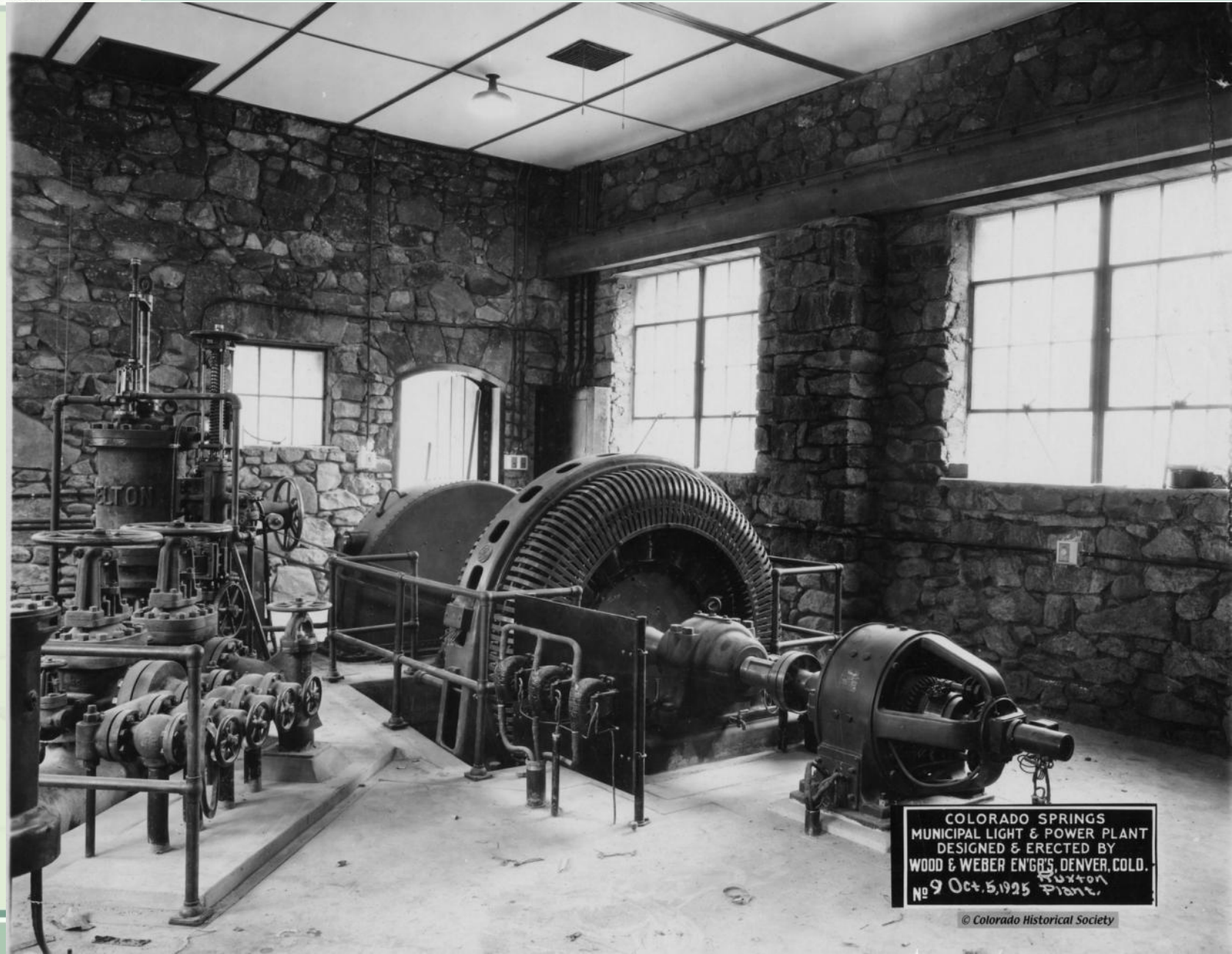

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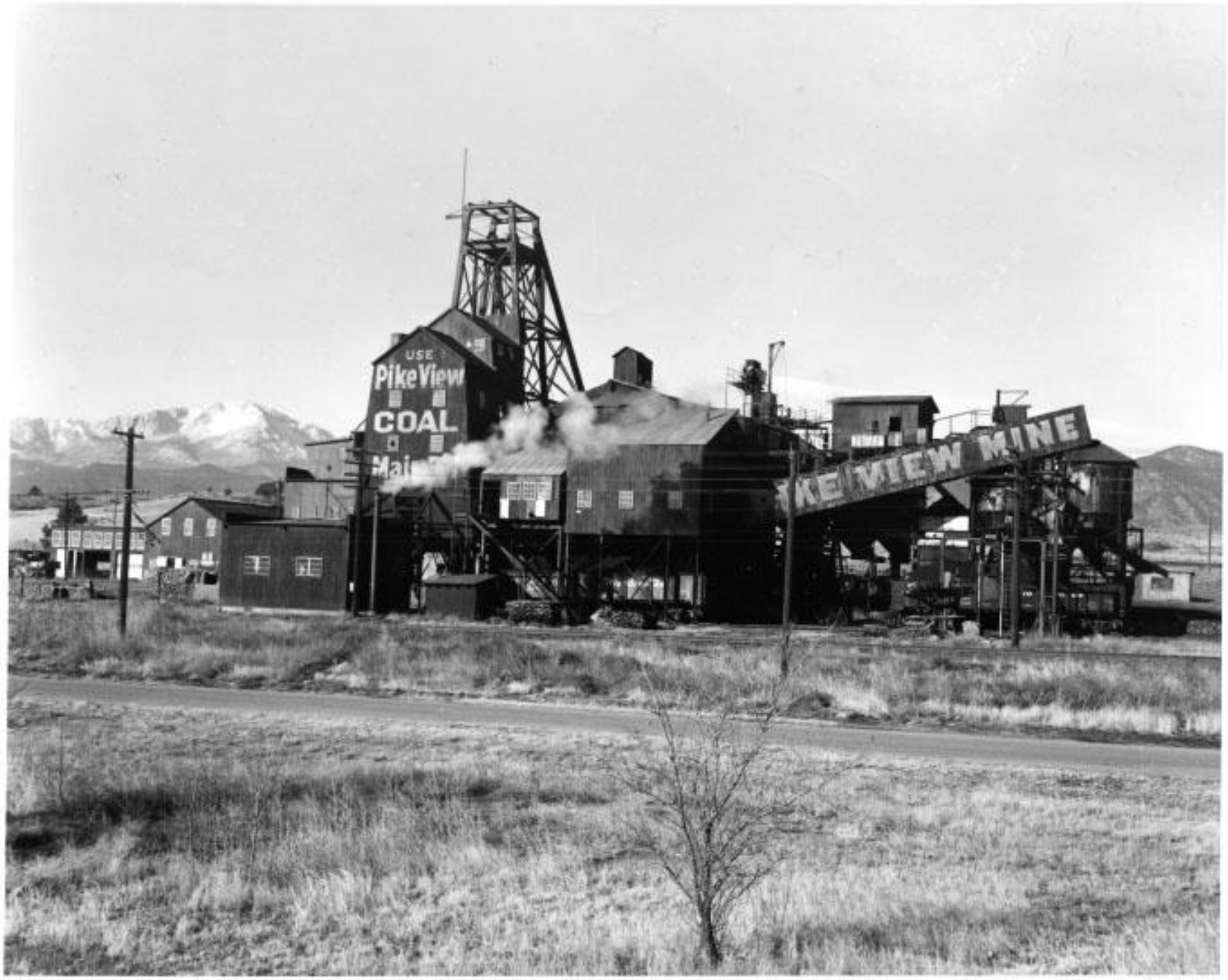
Pikeview Steam Plant

Built in 1925 at the Pikeview coal mine by the Golden Cycle Corporation.

Supplied power to the Pikeview Mine, Golden Cycle Gold Mill, Midland Terminal and M.&P.P. Railway Shops.

4000kw output.

Abandoned by 1957.


USE
PikeView
COAL
MINE

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Broadmoor Hotel Powerhouse

Built in 1926.

Fueled by Lignite that was delivered by the Street Railway.

500kw and 650kw steam turbine/generators added in the 1960's.

Only used for steam heating today.

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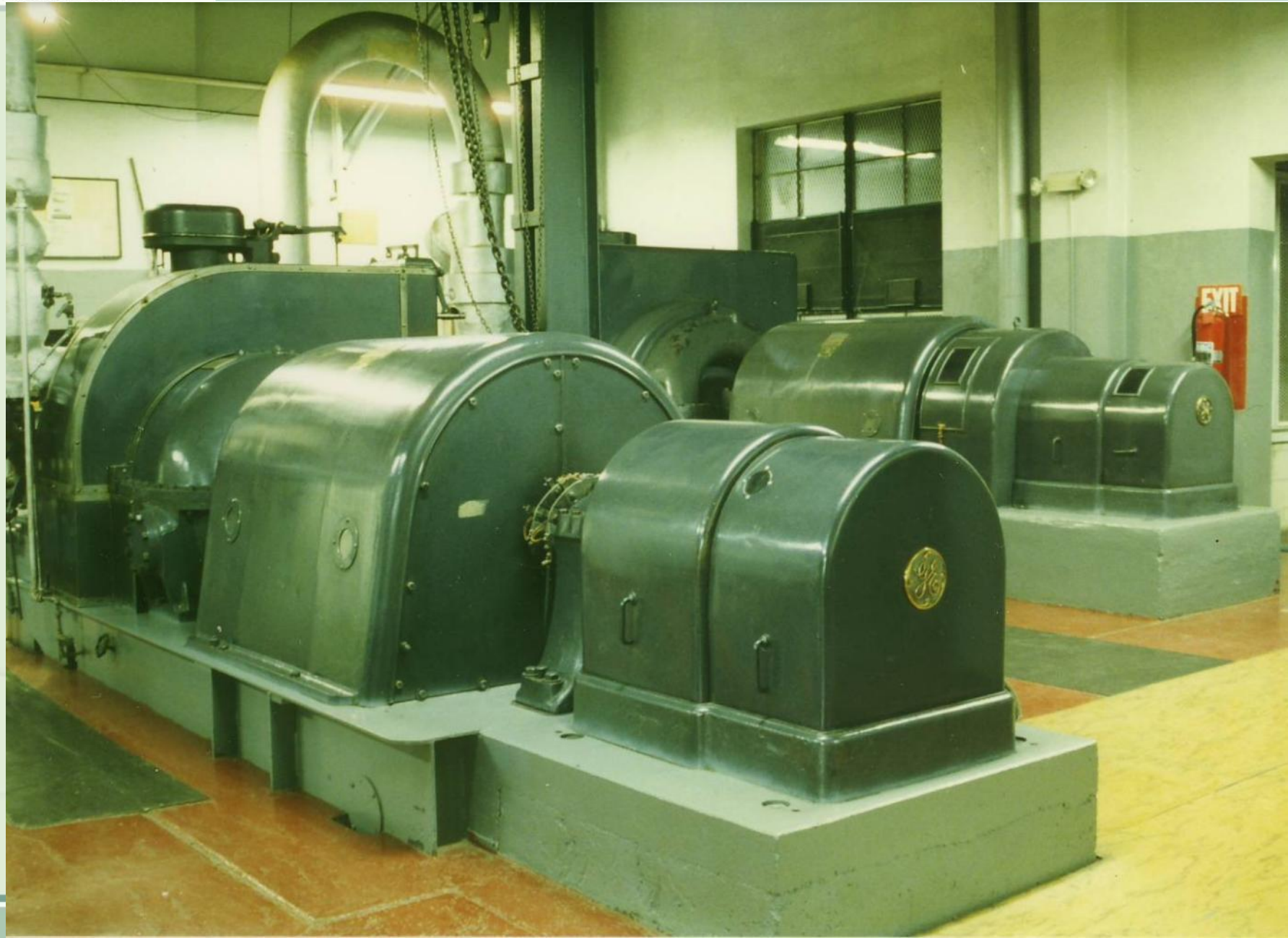

Birdsall Power Plant

Unit #1 (18 MW) on line in 1953

Unit #2 (18 MW) on line in 1954

Unit #3 (24.5 MW) on line in 1957.

The plant operates on natural gas or diesel fuel.

Used as a stand by plant.

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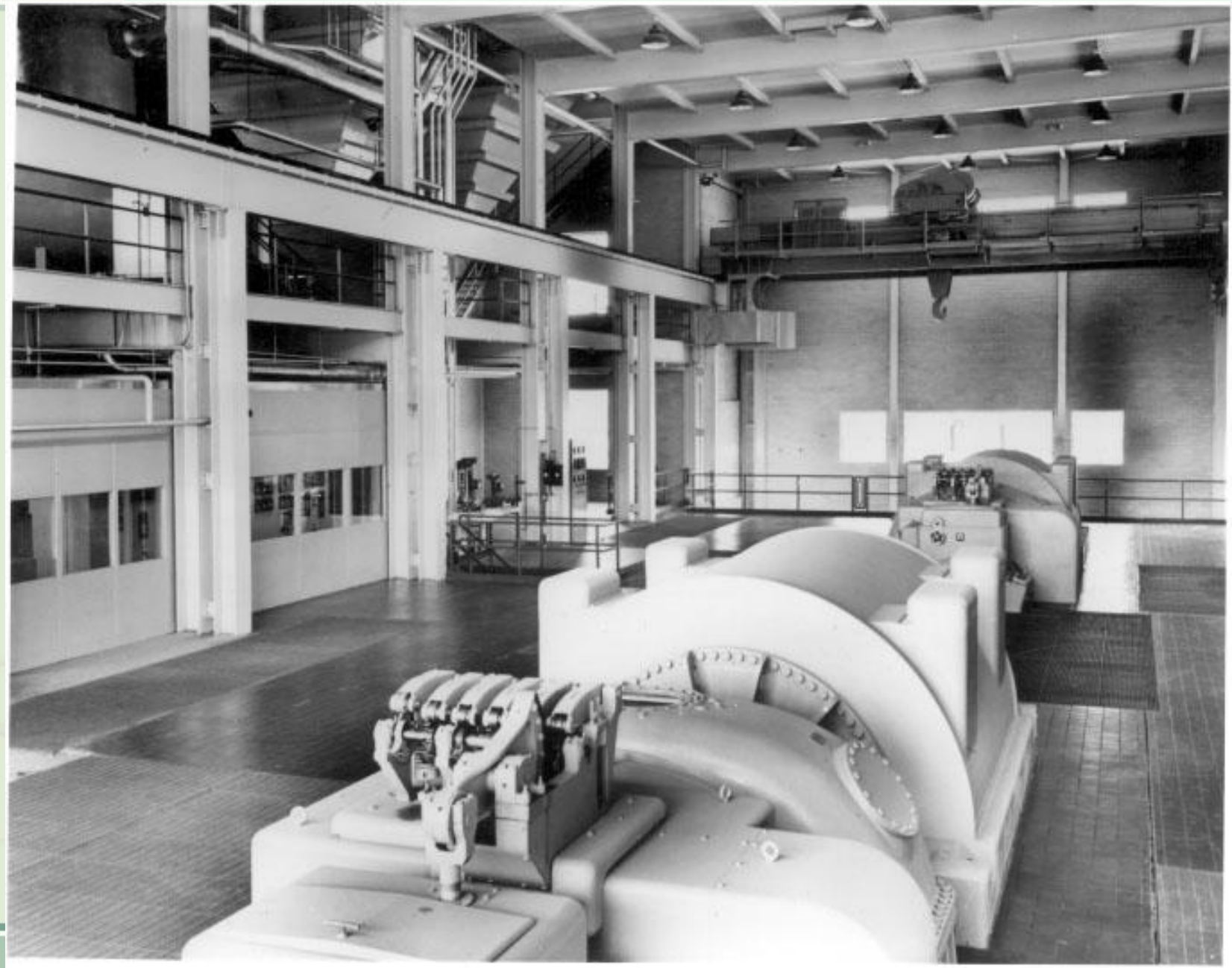

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Nixon Power Plant

Coal Fired Unit #1 is rated for 222 MW, built in 1982.

Units #2 and #3 are simple cycle gas turbines, each rated for 35 MW, built in 2000.

Located south of town on the Clear Springs Ranch site.

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CSUX 79009
CS UX
79 009
CSDPU
CAPY 195000
LD LMT 195900
LT WT 67100
HTS
NEW 3-79

Tesla Hydro Electric Plant

Named after Nikola Tesla, who in addition being one of the inventors of our modern AC power system, did some wireless electricity transmission experiments here in Colorado Springs in 1900.

Built in 1997 with a capacity of 28 MW.

Modern vertical, multi nozzle Pelton turbine (Swiss design).

80% of the water used by Colorado Springs passes through this unit.

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Front Range Power Plant

Built in 2002.

Rated for 510 MW (winter), 480 MW (summer).

Two gas turbines and two HRSGs and one steam turbine.

Massive 40 fan air cooled condenser.

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Cascade Hydro Electric Plant

In service February 2010.

It replaces a pressure reducing valve that had been in service on that site since1932.

Rated for 750 kw.

Double nozzle Pelton turbine and induction generator.

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Questions ????

If you have any questions or would like more information on anything in this presentation please contact:

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