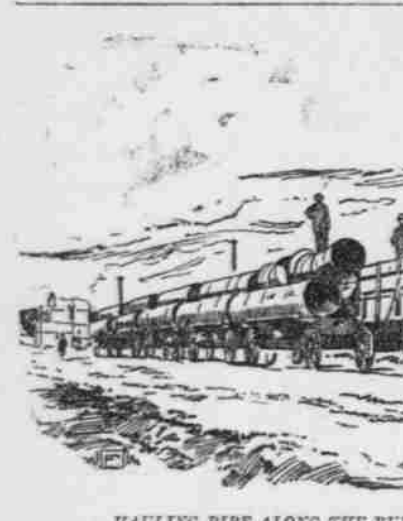


and the substantial trammor in which they have been built reflects no more on the water committee than it does on the Bureau Bridge Company...

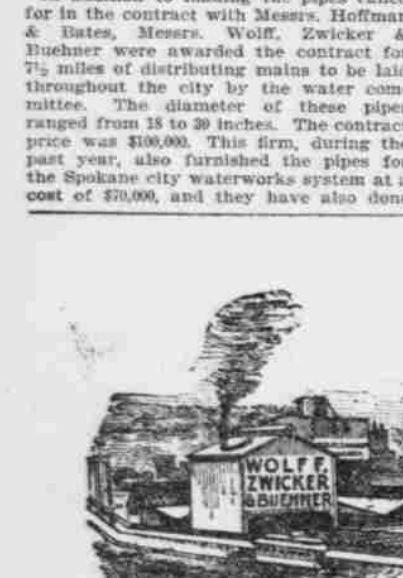
A GREAT PLAN.

Where the Pipes for the Bull Run System Were Made. The Wolf & Zwicker Iron Works was incorporated in 1882. It is the outgrowth of the former business of Wolf & Zwicker...



HAULING PIPE ALONG THE BULL RUN PIPE LINE—Photo by Towne.

sublet the contract to the Wolf & Zwicker Iron Works. The company to handle an undertaking of the magnitude necessary to turn out the pipes for the line as fast as the specifications of the contract called for...



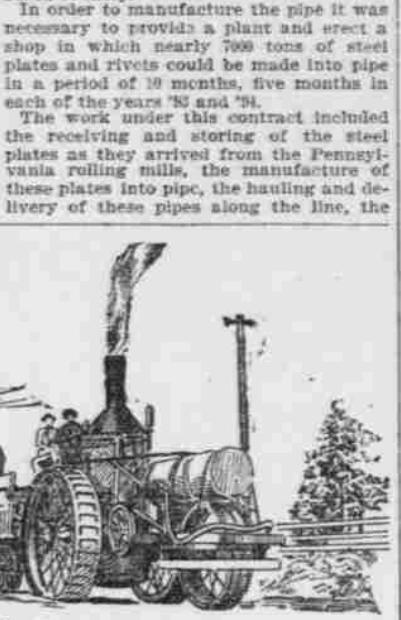
THE WOLF, ZWICKER & BUEHNER PIPE WORKS, AND THE WOLF & ZWICKER IRON WORKS.

other important work, reaching to all parts of the Pacific Northwest. The immense plant of this firm is located along the banks of the river at the eastern approach of the Madison-street bridge...

to any of the great industrial centers of the continent.

THEir Large Contract With the Water Committee.

HE principal contract in connection with the construction of the Bull Run pipe line was that for the manufacture and laying of the riveted steel pipes...



THE STEEL PLATES.

Furnished by the Risdon Iron Works, of San Francisco.

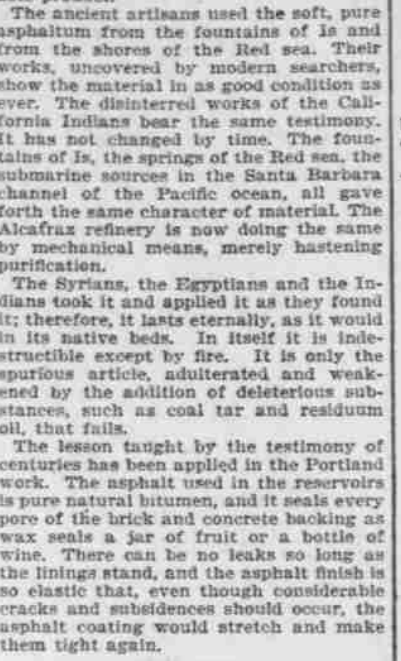
N the development of the great industries of the coast much credit is due the success which has been the growth of years and of unremitting labor...



THE RESERVOIR LINES.

Among the most interesting features of the construction of Portland's new water-supply system is the use of asphaltum for the finishing coat of the reservoir linings...

turn by the Aborigines of California in the Scientific American publication of February 2, 1884. The natives gathered their pitch as it floated ashore from the submarine sources in Santa Barbara channel...



ALCATRAZ ASPHALT REFINERY.

The Syrians, the Egyptians and the Indians took it and applied it as they found it; therefore, it lasts eternally, as it would in its native bed in the Indian subcontinent...



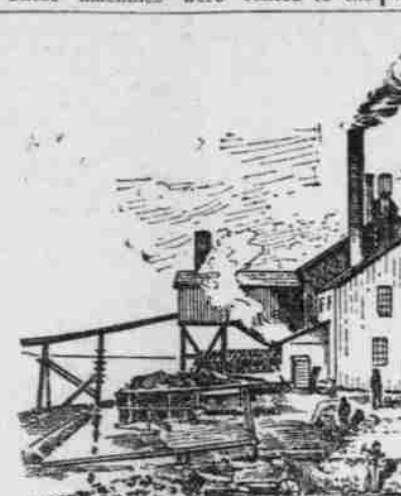
THE MEN WHO BUILT IT.

Colonel Isaac W. Smith. Colonel Isaac W. Smith has devoted his entire life to the profession of civil engineering. He was born in Spotsylvania county, Va. He is a graduate of the Virginia Military Institute...

of men, and some of the machinery of the largest coast vessels was turned out by this company. The Risdon Iron Works was established in San Francisco 20 years ago...

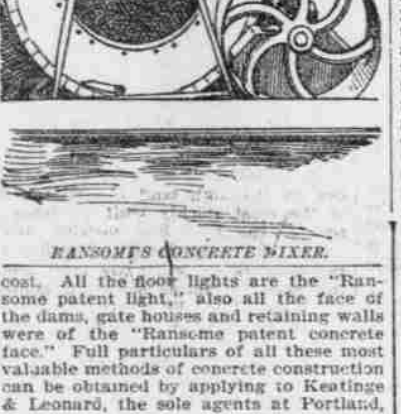
RANSOME'S PATENTS.

Value of the Concrete Mixer in Constructing the Reservoirs. HE out accompanying this article represents what is known as Ransome's patent concrete mixer...



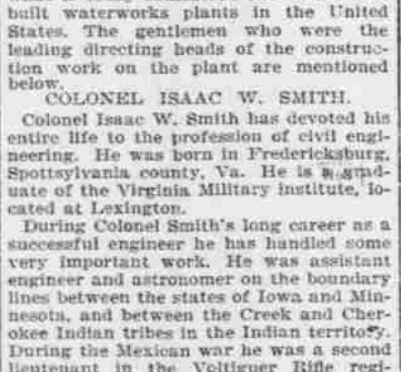
RANSOME'S CONCRETE MIXER.

coal. All the floor lights are the "Ransome patent light," also all the face of the strongest machinery and retaining walls were of the "Ransome patent concrete face." Full particulars of all these most valuable methods of concrete construction can be obtained by applying to Keatinge & Leonard...



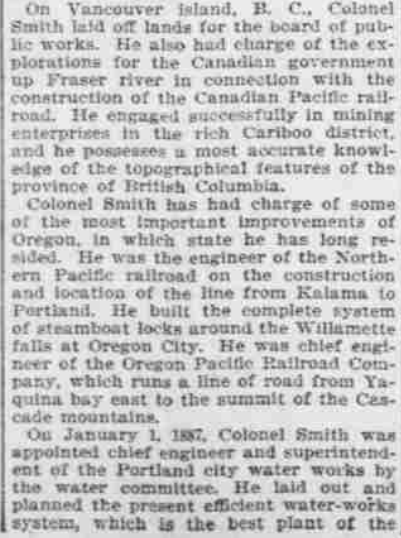
THE MEN WHO BUILT IT.

Those Who Directed the Work of Construction. The construction of the Bull Run plant has not only given employment to a large number of men, but it has also called for the display of the highest order of skill on the part of those on whom fell the responsibility of directing the men engaged in the active work of construction...



JAMES DIX SCHUYLER.

engineer on many other important water works and irrigation projects throughout the West and in the Sandwich Islands. He has made some interesting and useful contributions to the literature of his profession, which have added to his reputation among engineers...

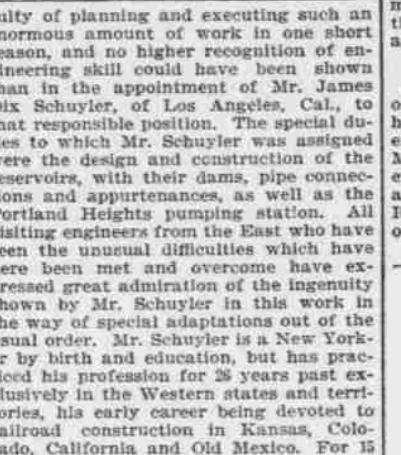


JOHN A. LESOURD.

kind on the coast and as complete as any in the United States. The great pumps, pipes, etc., of this system were all put in under the direction of Colonel Smith. The proposition to convey water from Bull Run river to Portland was first conceived by Messrs. Talbot and Cunningham nearly 20 years ago...

MR. JAMES D. SCHUYLER.

One of the rising young civil engineers of the coast is Mr. C. E. Oliver, who has held the important position of assistant engineer of the Bull Run system since May, 1892. Mr. Oliver has learned civil engineering by years of practical effort...



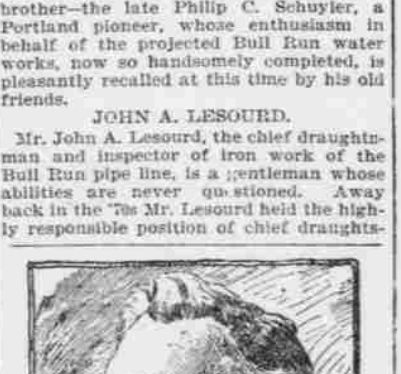
C. E. OLIVER.

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GEORGE OLIVER.

Mr. Oliver was born in Marion county, Iowa, in 1858. He was appointed principal assistant engineer of Portland in 1890. He held this office until he was during the period of Mr. Oliver's incumbency that many of the most important works in improvement of streets were laid out...



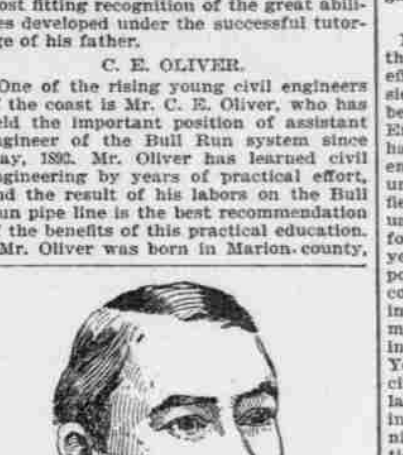
JOHN A. LESOURD.

Mr. John A. Lesourd, the chief draughtsman and inspector of iron work of the Bull Run pipe line, is a gentleman whose abilities are never questioned. Away back in the '70s Mr. Lesourd held the highly responsible position of chief draughts-

will position of chief draughtsman in the Willamette iron works, the leading iron works plant of the state. Mr. Lesourd was the first to plan for the construction of a pound engine ever built in Oregon, and this engine is now doing duty in the steam counter Alliance. He also superintended the construction of engines and machinery for some of the fastest river boats of the coast...

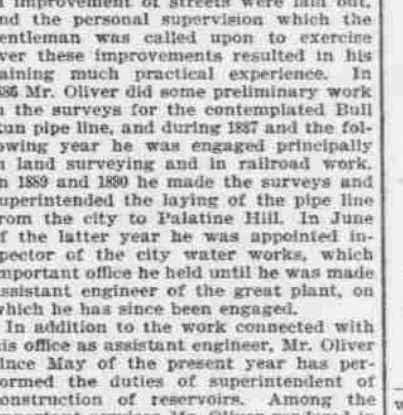
MR. D. D. CLARKE IS NEW ENGLAND BIRTH AND EDUCATION.

Mr. D. D. Clarke is of New England birth and education. He came to the Pacific Northwest in early manhood, and for 20 years has been identified with the public works of Oregon and Washington. Making his home in Portland from 1864 to 1873, he was engaged first upon the staff of the city surveyor, and later, during the railroad construction of that period, served as assistant engineer upon both the East and West Side roads...



D. D. CLARKE.

Mr. Clarke was his principal assistant. He has been a member of the American Society of Civil Engineers since 1882. His connection with the Portland works began in March, 1882.



F. H. YOUNG.

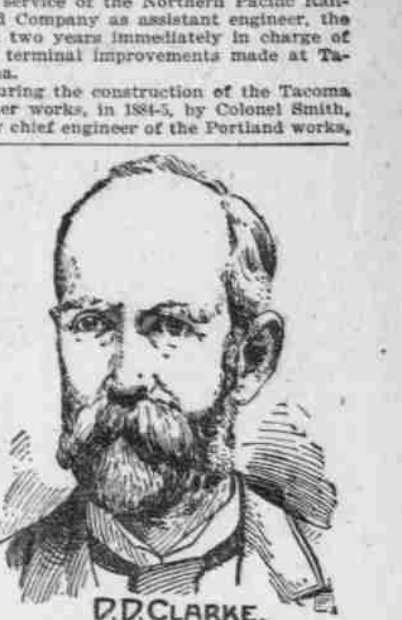
Mr. F. H. Young, assistant engineer of the water works since 1891. He located the bridge across the Sandy river in February, 1882. In October of the same year he located the distributing reservoir at Mount Tabor. Commencing active work on the pipe line itself in January, 1893, he located the line from the Sandy river to the headworks, eight miles up the Bull Run river...



E. E. COOPER.

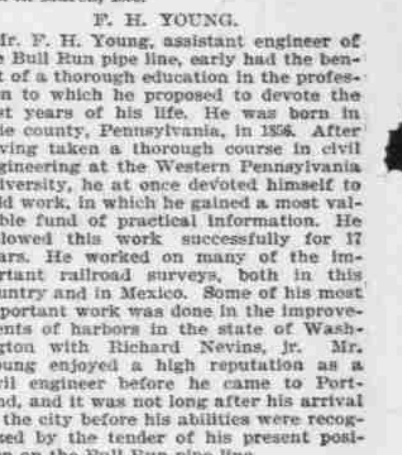
Mr. E. E. Cooper has direct charge of the construction of the concrete construction work on the Bull Run pipe line under Mr. Schuyler. His work has been principally confined to reservoirs 1, 2 and 4. The position has called for the constant attention of a man thoroughly versed in all the intricacies of the civil engineer's profession...

work is but a slight recognition of the ability of Mr. Moore and of the capacity of the Risdon Iron Works for turning out work of this character in all its perfection.



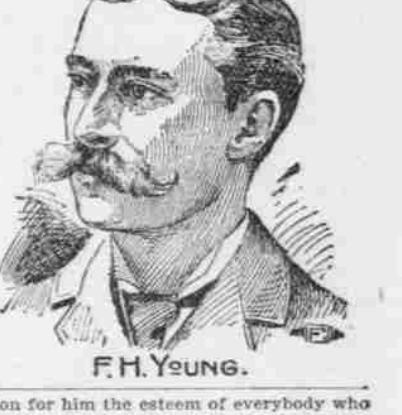
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