CONCRETE IN WATER WORKS CONSTRUCTION

Its Use in Dams, Reservoirs, Pipe, Filters, Pump Houses, Standpipes and Tanks—Paper Read Before Iowa Section, American Water Works Association

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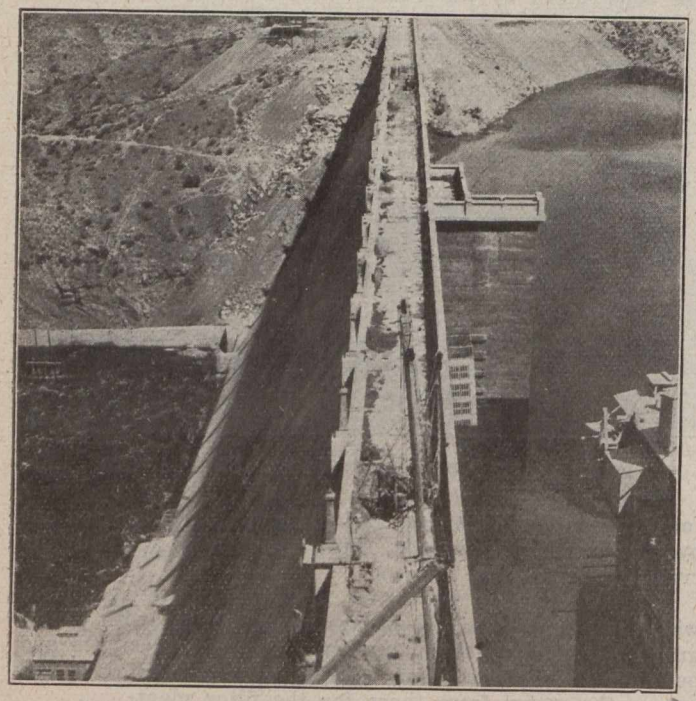
CONCRETE has been used very extensively in various parts of water supply works such as dams, reservoirs, pipe lines, tanks, standpipes, filters, settling basins, power houses, etc. Obviously, a detailed discussion of all these is beyond the limits of a single paper and it will be necessary to confine the discussion to very general terms in order that we may touch upon each of these items.

Dams

Dams for impounding water are very generally of concrete. Concrete dams are usually cheaper than cut-stone masonry dams and allow the utmost flexibility in meeting special local conditions.



Gravity Type Dam, 1,674 Ft. Long, 318 Ft. High

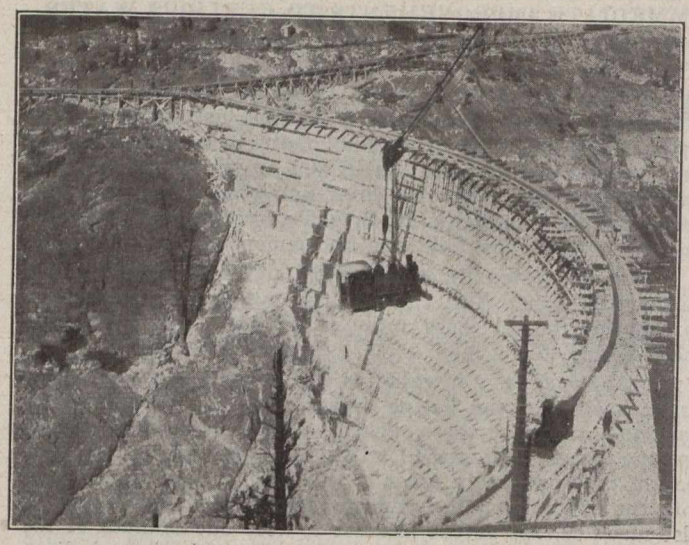
Earth dams, though sometimes low as to first cost when filling material may be excavated from side hills and dumped directly into the dam site, nevertheless have inherent weaknesses. Water flowing over the crest of an earth dam under flood conditions usually marks the failure of the dam. The activity of boring animals has also been responsible for earth dam failures since seepage or a small leak soon grows into a washout unless observed and corrected.

Concrete cores in earth dams constitute a step in the right direction and sometimes make the earth dam justifiable, but cannot be said to satisfy all the requirements of permanent dam construction under all conditions. Such a dam may fail by overflow or by a slide of filling material.

Concrete dams may be divided into four general types: (1) Gravity dams; (2) simple arch dams; (3) multiple arch dams; and (4) buttress and slab dams.

Choice of the type best suited to any particular case must be the result of thorough investigation and consideration of all of the local conditions.

Some of the highest and most massive dams in the world are of the gravity type. However, for long and relatively high dams the selection of this type has usually been due to certain very favorable local conditions as to supply of materials in large quantities or to a lack of sufficient investigation of other types.



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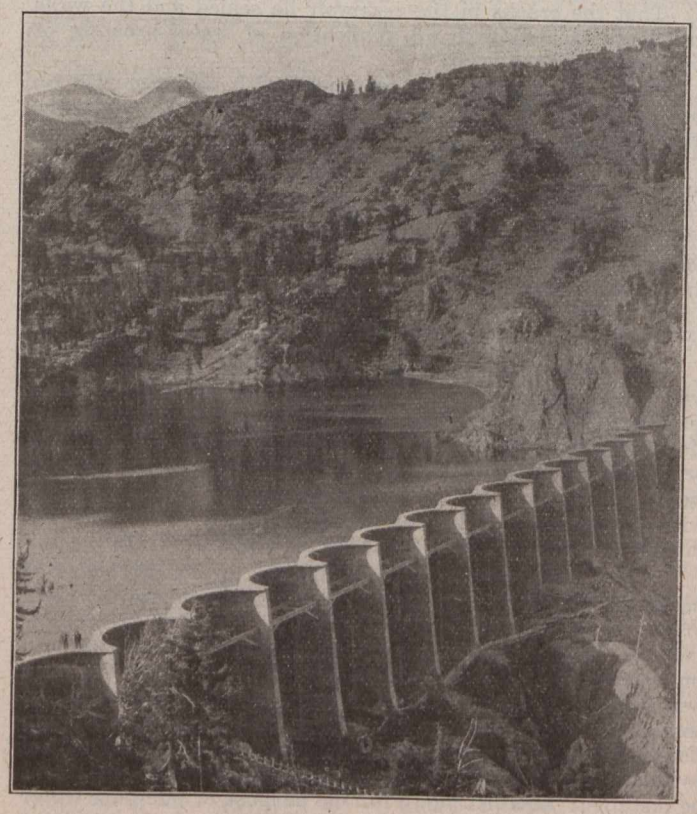
Arch Dam, 600 Ft. Long, 260 Ft. High

Gravity Dams

The gravity dam, of course, maintains its position and resists the thrust of the water by virtue of its great weight. Foundation conditions for high and heavy gravity dams must be very favorable in order to assure success within economical cost limits. Foundation conditions which, because of seams, will allow water to get under the dam or which are favorable to disintegration or erosion, require special treatment such as the construction of a deep cut-off wall under the base of the dam proper, filling the seams in the rock with grout and the construction of aprons both above and below the dam. The upward pressure exerted by water under the base of a dam may be responsible for failure. However, where foundation conditions are favorable, the gravity type will usually be found economical for relatively long and low dams.



Multiple Arch Dam, 700 Ft. Long, 84 Ft. High