

MUNICIPAL DEPARTMENT

COVERED RESERVOIRS.

(Concluded.)

The groined arch has ordinarily been used for this purpose, as it is admirably adapted for execution in concrete. Manifestly any improvement in the quality or resisting power of the concrete will correspondingly enhance the excellence of the reservoir covering. The spans have ordinarily ranged from 10 to 16 feet, or even more, and the size of piers from 18 to 30 inches square. The concrete used has seldom been leaner than one cement, three sand and five gravel or broken stone, the proportions of one, two and four having been used in a number of cases. With a thorough balance of the materials employed, however, the voids being reduced to a minimum, there seems to be no reason why concrete as lean as one cement to ten of sand and gravel or broken stone should not be employed. There are instances where concrete as lean as one to ten and a half has been used for similar purposes with complete success, and without more care or a higher degree of inspection than is entirely practicable in ordinary work. As a matter of fact, the capacity, so to speak, of lean concrete when suitably mixed and placed in work is scarcely yet developed. A thorough mixture of well-balanced ingredients suitably wet will produce results in such applications as groined arch work surprising even to many experienced engineers at the present time. There is in this direction ample room for a higher degree of excellence and economy than has yet been attained in covered reservoir construction.

It is also probable that the development of re-enforced concrete as applied in covered reservoir construction has yet seen only its beginning. The carrying capacity of relatively thin rectangular plates of that material supported along the four edges is not yet fully realized. When such plates are made continuous, so as practically to render the masonry cover of a reservoir a continuous plate over its entire area, or over large portions of its area, and reinforced by relatively thin arch ribs springing between piers, the carrying capacity is so greatly increased as to reduce the required quantity of material sensibly below that necessary for the groined arch of concrete without the steel. It is clearly a question of the balance between the additional strength given by a small amount of steel, a relatively high-priced material, and the use of a larger amount of the lower-priced concrete. As experimental investigations are pushed farther into the field of re-enforced or armored concrete its greatly increased carrying capacity becomes more apparent and the possibility of corresponding economy more clear.

Groined concrete arches, as they are at present constructed for reservoir pur-

poses, are frequently and perhaps usually not more than 6 inches thick at the crown with the spans ranging from 10 to 15 feet. It is obviously impracticable to make even a re-enforced concrete plate much thinner than that amount for such spans, but there may be an economical gain in avoiding the masonry in the spandrels of the groined arches. At any rate, there are yet some undetermined element in this particular line of construction in reference to which farther investigations will yield results, both interesting in character and of substantial economical value. Much progress

has already been made, so that at present the construction of the masonry reservoir covering is no longer a formidable consideration, and farther advances, bound to be made, will not only increase the excellence of the work but render still higher economy attainable.

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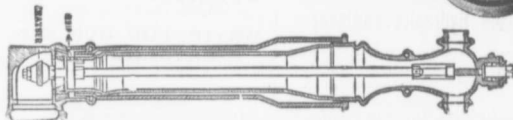
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