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1,806,255

ARCH DAM

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Fig. 1.

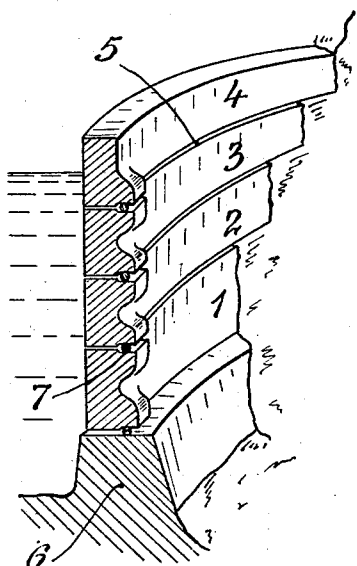


Fig. 2.

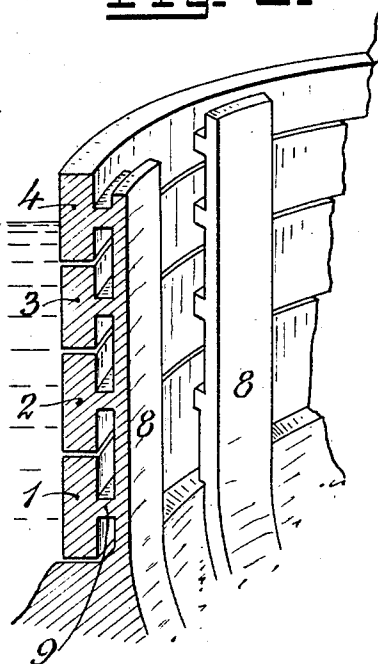
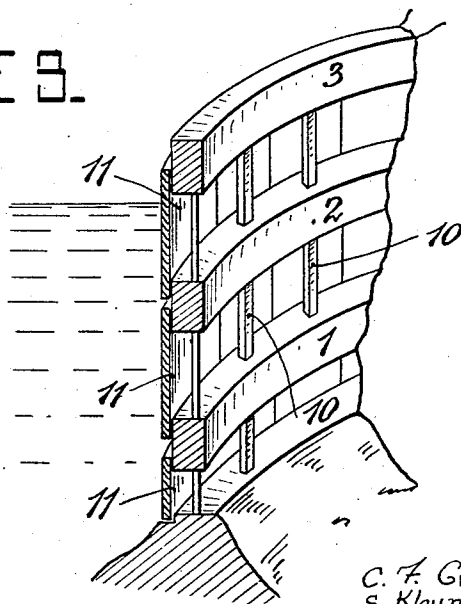


Fig. 3.



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ARCH DAM

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It is well known that the internal stresses in a monolithic arch dam construction vary considerably from the base to the crown owing to the different pressures to which the dam face is exposed at varying water levels and to the different lengths of the arch at different levels. As the several parts of the dam arch will be subject to different deformations under the varying load conditions, statically undetermined stresses of considerable magnitude will develop in the dam vault, and these stresses in many cases will cause ruptures and will be a constant source of danger.

The present invention has for its object an arch dam construction in which this drawback is avoided, and by the use of which the stresses in the dam are all statically determined.

This is obtained in accordance with the present invention by dividing the dam vault in a number of superposed horizontal arches which are independent of each other and are permitted to move with regard to each other in the direction of the pressure to which the dam vault is exposed.

Hereby it is obtained that the deformation of each dam arch may take place without exposing the rest of the dam vault located above or below the arch in question to any stresses.

On the drawings there is illustrated by way of example some arch dams constructed in accordance with the principle of the present invention.

Fig. 1 is a diagrammatic sectional view with parts illustrated in perspective of one form of the invention.

Fig. 2 is a similar sectional view of a second embodiment of the invention, and Fig. 3 is a similar view of a third embodiment of the invention.

In accordance with the embodiment of the invention illustrated on Fig. 1, the dam vault comprises four horizontal arches 1, 2, 3, 4, which are separated from each other by narrow horizontal slots 5. The several arches are supported by each other and by the base 6 by means of intermediate supporting members, such as 7, which are adapted to permit movement of each dam arch in the direction of the pressure independent of the other

arches, with the object of allowing free deformation of each arched section of the dam vault.

Suitable tightening or packing means may be utilized for preventing or reducing the escape of water through the slots.

According to the embodiment of the invention illustrated on Fig. 2, each arch 1, 2, 3, 4 is supported by means of vertical columns or pillars 8, which in accordance with the embodiment illustrated, are mounted on the downstream side of the dam, and which are so constructed as to be able to yield sufficiently in the direction of pressure to allow for freedom of deformation of the several arches independently of each other.

Although the columns 8 in the embodiment illustrated are mounted on the downstream side of the dam, it will be understood that it does not alter the principle of the invention if the said columns be erected on the upstream side of the dam.

The connection between the supporting columns 8 and the vault arches 1—4 may take the form of a concrete stay 9 cast in one piece with the supporting columns, or any other form of connection may be utilized.

The columns 8, which as will be understood are only exposed to vertical stresses (the weight of the dam arches) in some cases may be located close to each other so as to be separated by means of narrow vertical slots only with the object of forming a substantially continuous protecting wall of the downstream side of the dam.

In accordance with the embodiment of the invention illustrated on Fig. 3, three horizontal arches are utilized, said arches being supported on each other by means of pivoted or yielding columns 10.

The upstream face of the dam according to this embodiment of the invention is formed by substantially independent slabs 11, which are supported by the arches 1, 2, 3 and are mounted with sufficient loose play to allow for the independent deformation of the arches.

In accordance with this embodiment of the invention one obtains the advantage which consists in the possibility of choosing different materials for the face covering and the

supporting arches, each material or mixture being chosen to suit the particular purpose for which it is destined.

It will be understood that the constructional embodiments illustrated on Figs. 1 or 2 may be combined with the embodiment illustrated on Fig. 3, making the slots between the arches of the two first embodiments wider than illustrated on the drawing, and covering the space between each arch with slabs of the kind illustrated on Fig. 3.

Claims:

1. In an arch dam a dam vault comprising a number of horizontal continuous and uninterrupted arches, supporting columns for transmitting the weight of said arches to a foundation, said supporting columns being individually connected with each of said arches, so as to support the same independently of each other.

2. In an arch dam a dam vault comprising a number of separate horizontal continuous and uninterrupted arches and vertical columns adapted to yield in the direction of pressure, said columns being individually connected with each of said arches so as to transmit the weight thereof to a foundation.

3. In an arch dam a dam vault comprising a number of separate horizontal continuous and uninterrupted arches and vertical columns adapted to yield in the direction of pressure, said columns forming a vertically slotted protecting wall on the downstream side of the vault, each column being individually connected with each of said arches so as to transmit the weight thereof to a foundation.

In testimony whereof we affix our signatures.

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