

No. 840,110.

PATENTED JAN. 1, 1907.

H. L. COBURN.
DAM.

APPLICATION FILED MAY 2, 1906.

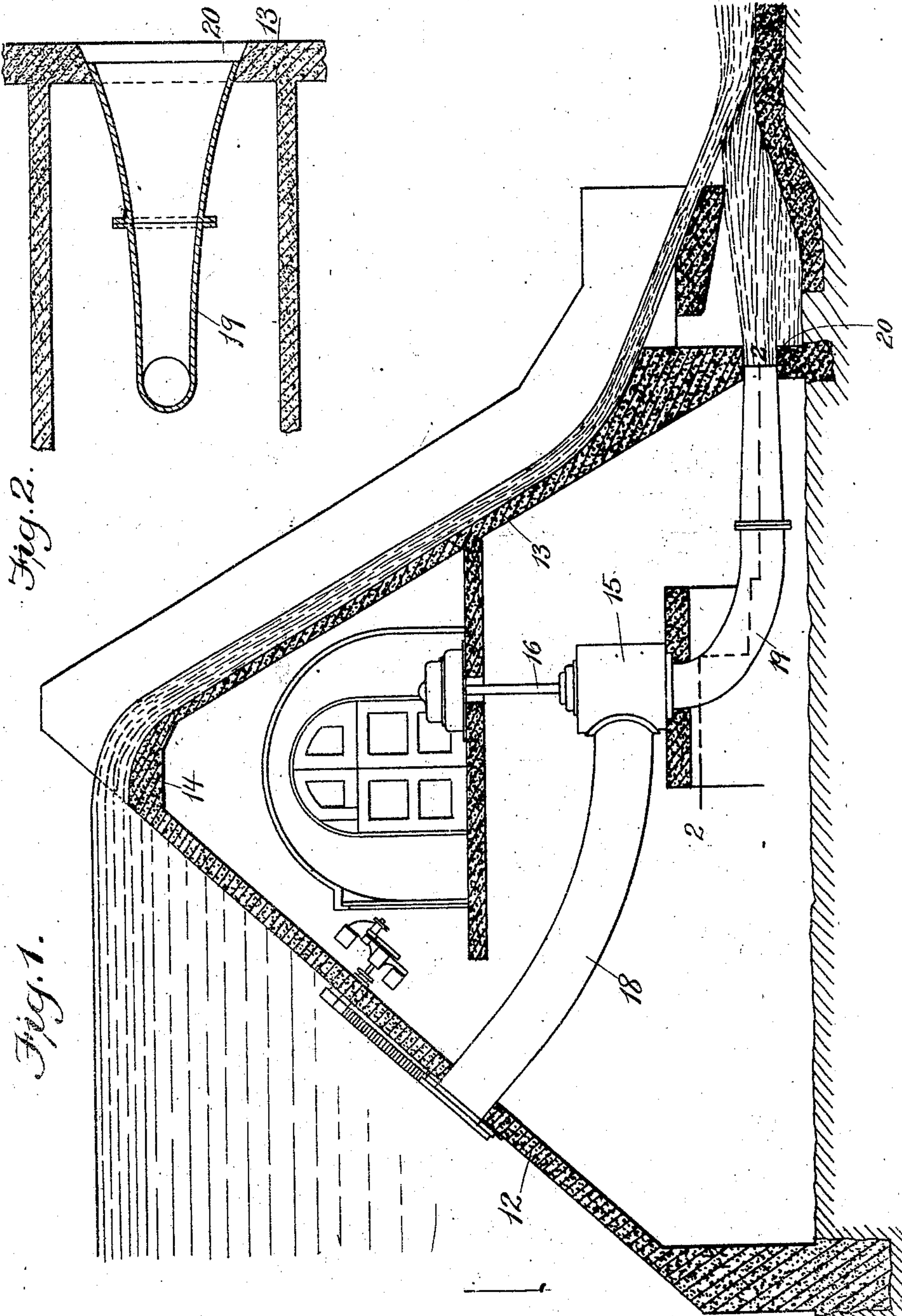


Fig. 1.

Fig. 2.

Witnesses.
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UNITED STATES PATENT OFFICE.

HOWARD L. COBURN, OF BOSTON, MASSACHUSETTS.

DAM.

No. 840,110.

Specification of Letters Patent.

Patented Jan. 1, 1907.

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To all whom it may concern:

Be it known that I, HOWARD L. COBURN, of Boston, in the county of Suffolk and State of Massachusetts, have invented certain new and useful Improvements in Dams, of which the following is a specification.

This invention relates to a dam formed to inclose or protect a space between the upstream and downstream sides of the dam, said space being utilized as a power-station by installing therein power-utilizing means, such as a turbine and its accessories, a conduit being employed to supply water to the turbine from the upstream side of the dam.

The invention is an improvement on a dam of this character in which the said conduit discharges the tail-water from the turbine in the lower portion of the space protected by the dam, the tail-water which accumulates in the said space flowing therefrom through an outlet under the overfall passing over the dam. The flow of tail-water from the protected space is accelerated by the action of the overfall, which induces an outward movement of the accumulation of tail-water.

My invention has for its object to enable the flow inducing or exhausting function of the overfall to be exerted directly upon the water at the discharge end of the conduit instead of being exerted on an accumulation of tail-water discharged within the space protected by the dam.

My invention is therefore embodied in a power-space-inclosing dam having a continuous conduit extending downwardly from the upstream side of the dam through the protected space to the downstream side, the outlet end of the conduit being under the path of the overfall and exposed to the inducing or exhausting action of the latter, so that the flow of water throughout the entire length of the conduit, and especially through the delivering or draft-tube portion thereof, is continuously accelerated, a partial vacuum being constantly maintained at the outlet end of the draft-tube. This vacuum has the same effect that would be produced by an increase of the head of the acting water, the energy of the latter being increased and the increase being proportioned to the velocity of the flow of the overfall.

Of the accompanying drawings, forming a part of this specification, Figure 1 represents a transverse section of a dam embodying my invention. Fig. 2 represents a section on line 2 2 of Fig. 1.

The same numerals of reference indicate the same parts in both figures.

In the embodiment of my invention here shown for purposes of illustration the dam is of shell form and of reinforced concrete construction. It comprises a deck 12, an apron 13, and a crest 14, uniting the deck and apron, the whole covering a space between the upstream and downstream sides of the dam. In said space may be installed a turbine, the casing of which is shown at 15, the shaft 16 of the turbine being connected with a dynamo or other power-utilizing means.

18 represents a feed-pipe, the intake end of which is in the deck 12, the said pipe extending downwardly to the wheel-casing.

19 represents a draft-tube, which extends continuously from the wheel-casing to an outlet-opening 20 in the downstream-wall of the dam. The feed-pipe 18, wheel-casing 15, and draft-tube 19 therefore constitute a continuous conduit extending downwardly from the upstream side of the dam through the space protected by the dam to the downstream side and discharging outside the said space instead of discharging, as heretofore, into the lower portion of the space, the draft-tube having a liquid-tight connection with the lower portion of the apron 13, so that the discharge from the draft-tube is wholly external to the space protected by the dam.

The outlet 20 is located under the path of the overfall, the portion of the apron over the outlet being so inclined that the overfall is projected forcibly downstream from the delivering end of the outlet. The movement of the overfall creates a partial vacuum at the outlet 20, and therefore exhausts water and air directly from the draft-tube 19. The flow of water through the entire conduit, and especially through the draft-tube portion thereof, is thus materially accelerated, the degree of acceleration depending on the velocity of the overfall at the point where it leaves the apron of the dam. The exhausting action of the overfall is concentrated at the draft-tube by the liquid-tight connection of the latter with the downstream side of the dam and, as already stated, has an effect which is equivalent to an increase in the head of the water flowing through the conduit. It will be seen, therefore, that by extending the draft-tube to the downstream side of the dam, so that its discharging end is subjected to the influence of the overfall, I have accomplished a distinctly new result—namely

to increase the effective head or pressure of the water. The draft-tube 19 is preferably horizontally widened or flared outwardly toward its discharging end, as indicated in Fig. 2.

5 I claim—

A power-space-inclosing dam having a continuous conduit extending downwardly from the upstream side of the dam, through
10 said space, to the downstream side of the dam, said conduit including a wheel-casing

and a draft-tube, the outlet end of the draft-tube portion of the conduit being under the path of the overfall, whereby the overfall is caused to accelerate the flow of water through
15 the draft-tube.

In testimony whereof I have affixed my signature in presence of two witnesses.

HOWARD L. COBURN.

Witnesses:

C. F. BROWN,
E. BATCHELDER