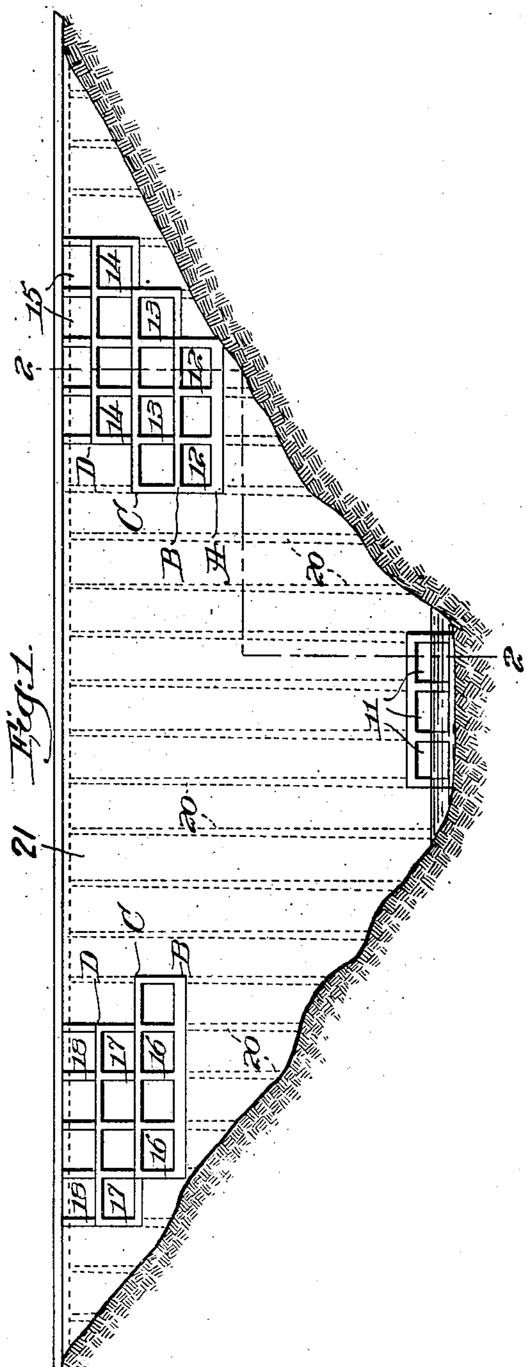
N. F. AMBURSEN.

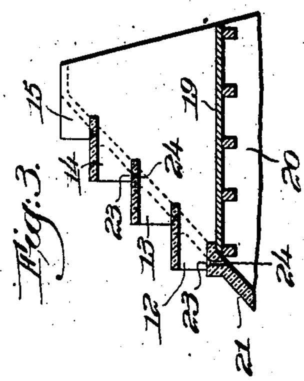
DAM AND THE METHOD OF CONSTRUCTING THE SAME.

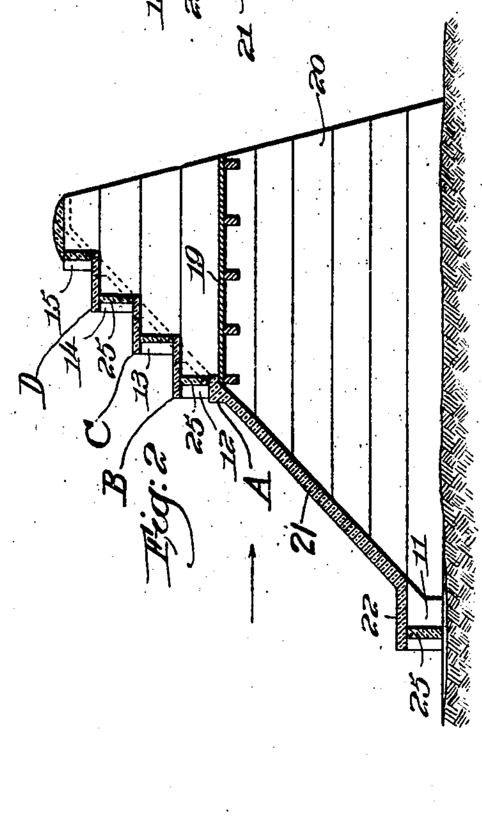
APPLICATION FILED MAY 29, 1912.

1,054,163. **Patented Feb. 25, 1913.**

2 SHEETS—SHEET 1.







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2 SHEETS—SHEET 2.

Fig: 4.

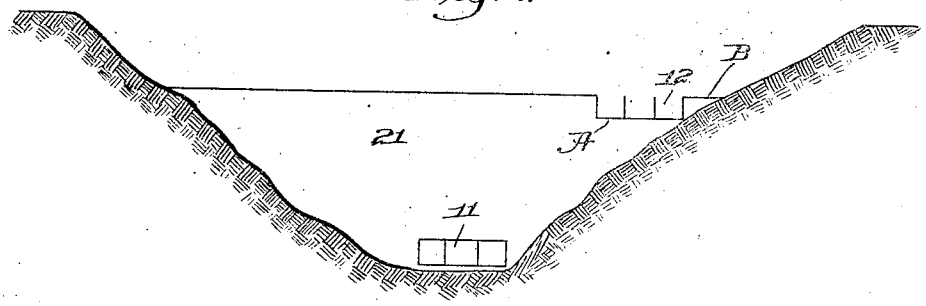


Fig: 5.

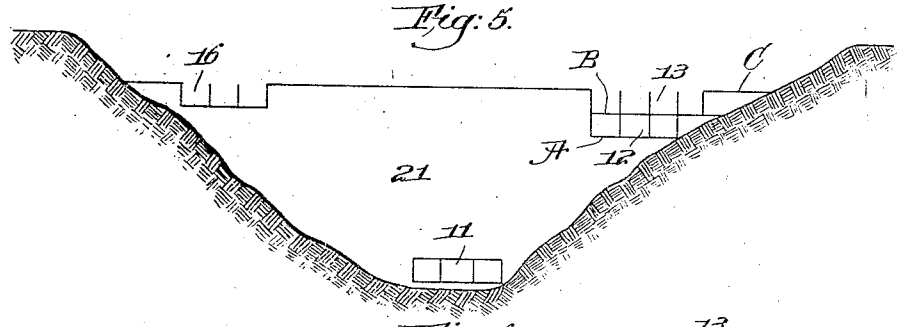


Fig: 6.

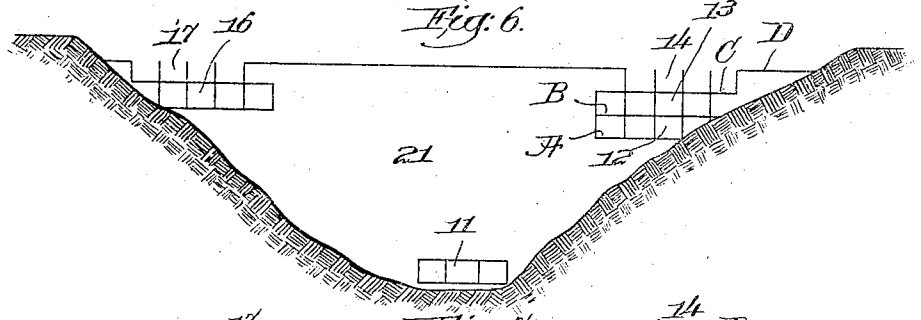
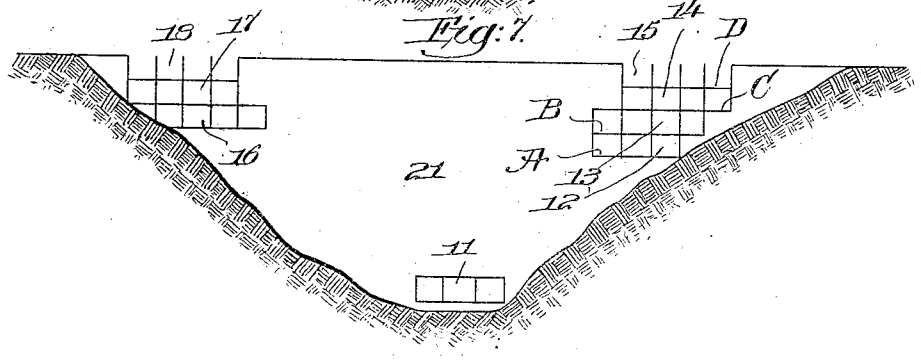


Fig: 7.



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UNITED STATES PATENT OFFICE.

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DAM AND THE METHOD OF CONSTRUCTING THE SAME.

1,054,163. Specification of Letters Patent. Patented Feb. 25, 1913.

Application filed May 29, 1912. Serial No. 700,390.

To all whom it may concern:

Be it known that I, NILS F. AMBURSEN, a citizen of the United States, and a resident of Brookline, in the county of Norfolk and State of Massachusetts, have invented certain new and useful Improvements in Dams and the Method of Constructing the Same, of which the following is a specification.

This invention relates to the construction of dams especially for the purpose of enabling water to be stored during the construction of the dam, the arrangement and method being such that the water of the stream can be held back by the dam during the process of building the same and without the employment of any coffer-dam structures.

Heretofore it has been customary in the construction of dams to leave openings or sluices in the bottom to provide for the ordinary run of the stream or river, the upper structure being complete before these sluices could be closed. When the stream is small and the dam large, and the storage capacity is intended to be of a large magnitude, it sometimes would require a year or two to fill the pond after the structure was complete. During this period the interest on the money expended becomes a large item since the reservoir or pond cannot be used until it is entirely filled. My invention, however, provides for the raising of the water level substantially or practically as fast as the structure work progresses, until the top of the dam is complete.

While my invention as illustrated in the accompanying drawings is embodied in a reinforced concrete dam of the general construction illustrated in United States Letters Patent 768,717 and 781,871, my said invention can also be embodied in solid concrete dams or masonry dams.

Frequently the profile of the valley is such that the lower part of the pond or reservoir will be quite narrow. In such case and especially when the fall of the stream or river is steep, it requires comparatively little time to fill the reservoir to about one-half its final depth, or nearly so. After this level has been reached, the reservoir will fill slowly because the area of the pond rapidly increases. Such filling of the upper half will therefore be so slow that it will not interfere with the construction of the upper part of the dam. As hereinafter described, it is considered better for convenience sake, to build the dam to about one-half of its height (including, of course, one or more sluices) before proceeding with the upper structure and upper sluices, so as to begin the filling of the reservoir before the upper part of the dam is completed. If the stream is quite small and the filling of the pond very slow, the upper sluices hereinafter described need not be employed. But if the rising of the water should over-take the construction work, it is desirable to provide upper sluices to take care of the water as hereinafter described. These sluices can be closed permanently or temporarily by any suitable construction of wood, concrete or steel, or such as described in said Patent 781,871.

The invention consists in the improvements which I will now proceed to describe and claim.

Of the accompanying drawings:—Figure 1 is an elevation of a dam looking down stream. Fig. 2 represents a section on line 2—2 of Fig. 1. Fig. 3 is a section similar to a portion of Fig. 2, but omitting the barriers of the sluices. Figs. 4, 5, 6 and 7 are views similar to Fig. 1 but on a smaller scale and entirely diagrammatical, indicating different progressive steps of the construction.

The same reference characters indicate the same parts in all the figures.

In carrying out the invention I construct the dam having a deck 21 and such buttresses 20 as may be desired, commencing at the bottom as usual and providing one or more sluices 11. These sluices will be preferably constructed as described in Patent 781,871, and the construction of the dam in such manner as described in said patent will be continued to about elevation A. A suitable flooring 19 is then laid, as indicated in Fig. 2. The building of the dam is then proceeded with to about the elevation B, forming one or more sluices 12, as shown in Fig. 4, the number or size of said sluices being such as to carry the ordinary flow of water. Of course, during the gradual upbuilding, of the dam, if of concrete, the buttresses 20 will be included. The elevation B will be substantially the same the entire width across the stream, as indicated in said

Fig 4. The lower sluice or sluices will now be closed as by means of a temporary gate and a subsequently built or applied barrier or closure, as described in said Patent 781,871, or a permanent barrier may be otherwise applied or built in. The platform 22 may be a solid slab but in any event it is to be water-tight of course. During the closing of the lower sluice or sluices 11, or immediately thereafter, the dam is built higher to the elevation C, as indicated in Fig. 1, including during the building, one or more sluices 13, 16. Then the sluices 12 and 13 are closed in the same manner as has been described in connection with the sluices 11, and it may be assumed that the water has reached the elevation B. The closing of the sluices 12 and 13 will then cause the surplus water to run through the sluice or sluices 16 if the water has overtaken the construction work. The dam is then further built to the level D indicated in Fig. 6 including additional sluices 14 and 17, and as soon as these are complete the sluices 16 and 17 will be closed, resulting in turning the water through the sluice or sluices 14. The dam may then be built still higher as indicated in Fig. 7, including one or more sluices 15, 18 at each end of the dam and as soon as this is complete the sluices 14 and 15 will be closed, resulting in turning the water through the sluice or sluices 18. Upon now closing the latter, the structure may be completed and the reservoir filled to its full capacity.

It is to be understood that I do not limit myself to the height of the dam, its shape or the material of which it is constructed, or the number of courses or the number of vertical series of sluices. The building of the dam, starting at the bottom and continuing to the top while providing for the gradual accumulation or storage of water as the work on the dam progresses, results in a great saving of time. For instance, if a dam, according to the ordinary method of construction, would require a year to build and another year for the pond or reservoir to fill, there will be, under my invention, a saving of approximately one year of time in obtaining the filled reservoir.

The use of temporary gates to close a sluice or tunnel, behind which temporary gate a permanent barrier is built, is fully described in Patent 781,871.

In building a dam according to my present invention, I preferably employ the same or similar arrangement of temporary gates and permanent barriers as described in that patent. Any leakage through the temporary gates can be taken care of by a gutter 23 connected with a drain 24 which will prevent the washing out of cement or concrete in the permanent closure, behind the gate during construction.

In Fig. 3 the upper sluices left in the deck are all shown as open, for the purpose of facilitating an understanding of the invention. It is to be understood, however, that the permanent barriers 25 indicated in Fig. 2 will be built in progressively, as hereinafter described.

It is to be understood that while I illustrate three sluices 11, and 3, or more in each of the other series 12 to 18 inclusive, there may be but one in each location, or there may be more in each series, the number and series depending entirely on the convenience of the builder and according to the demands of the particular stream that is being dammed.

I claim:—

1. The method of providing for the storage of water consisting in building the lower portion of a dam with a sluice, continuing the building to a point sufficiently high to be above the level of rapid accumulation, then closing said sluice of the lower portion, and continuing the building of the dam to the top in advance of the rising water.

2. The method of providing for the storage of water, consisting in building a dam with a plurality of sluices at different elevations, closing the lower sluices after the formation of the upper sluices, and finally completing the dam.

3. The method of providing for the storage of water, consisting in first building the lower portion of a dam with a sluice, then building an upper portion with an additional sluice, then closing the lower sluice, and then proceeding to finish the top of the dam.

4. The method of providing for the storage of water, consisting in first forming a comparatively low dam having a sluice, increasing the height of the dam and providing the higher portions with sluices, and closing the sluices successively from the bottom up.

5. A dam having a plurality of closed sluices at different elevations.

6. A dam having a closed sluice near its base, and having also closed sluices at higher elevations near the ends.

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

NILS F. AMBURSEN.

Witnesses:
C. F. Brown,
Peter W. Pezzetti.