C. F. DOEBLER.

DAM CONSTRUCTION.

APPLICATION FILED OCT. 11, 1910. RENEWED OCT. 11, 1911.

1,010,602. **Patented Dec. 5, 1911.**

4 SHEETS—SHEET 1.

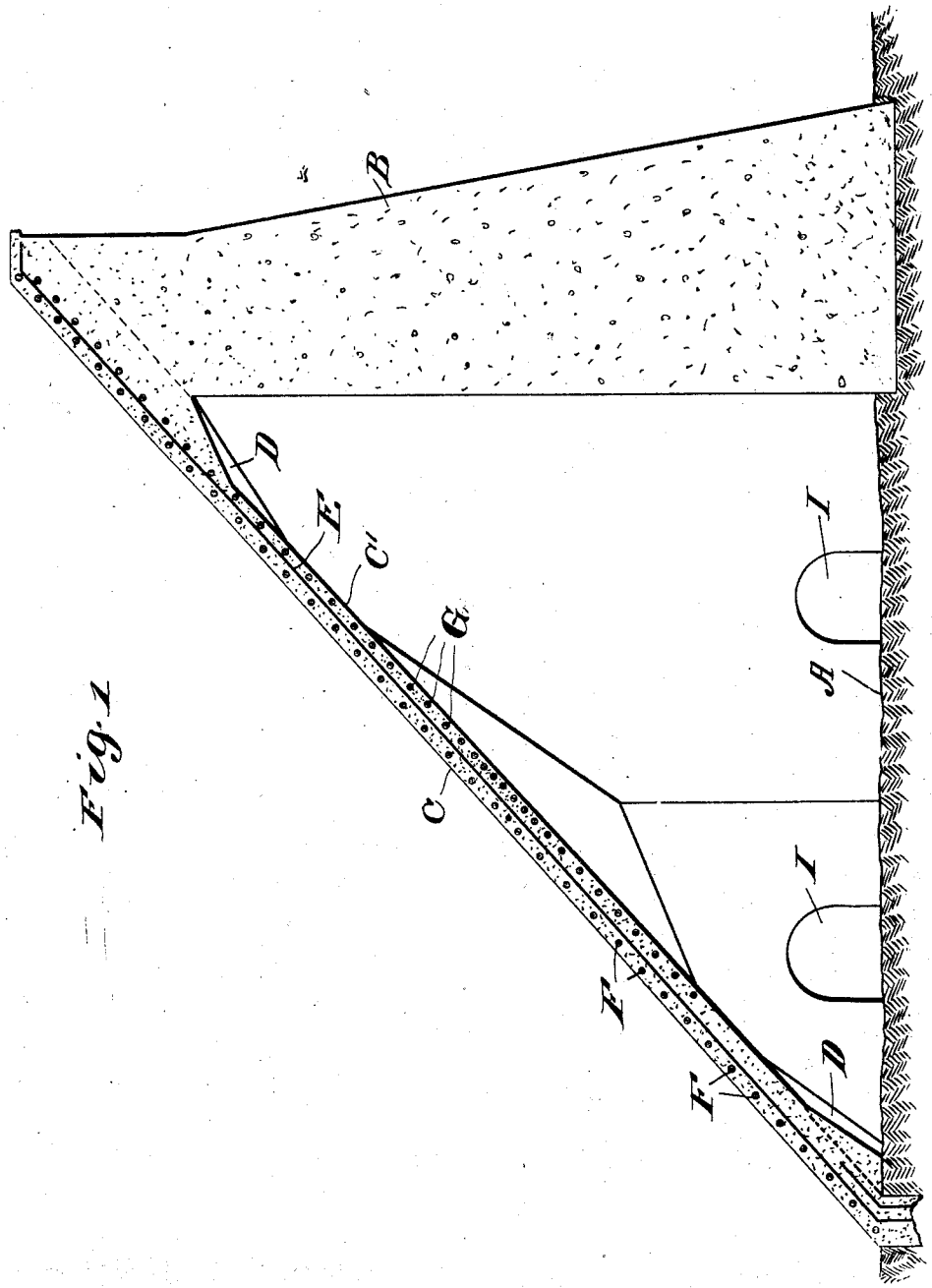

Fig. 1.

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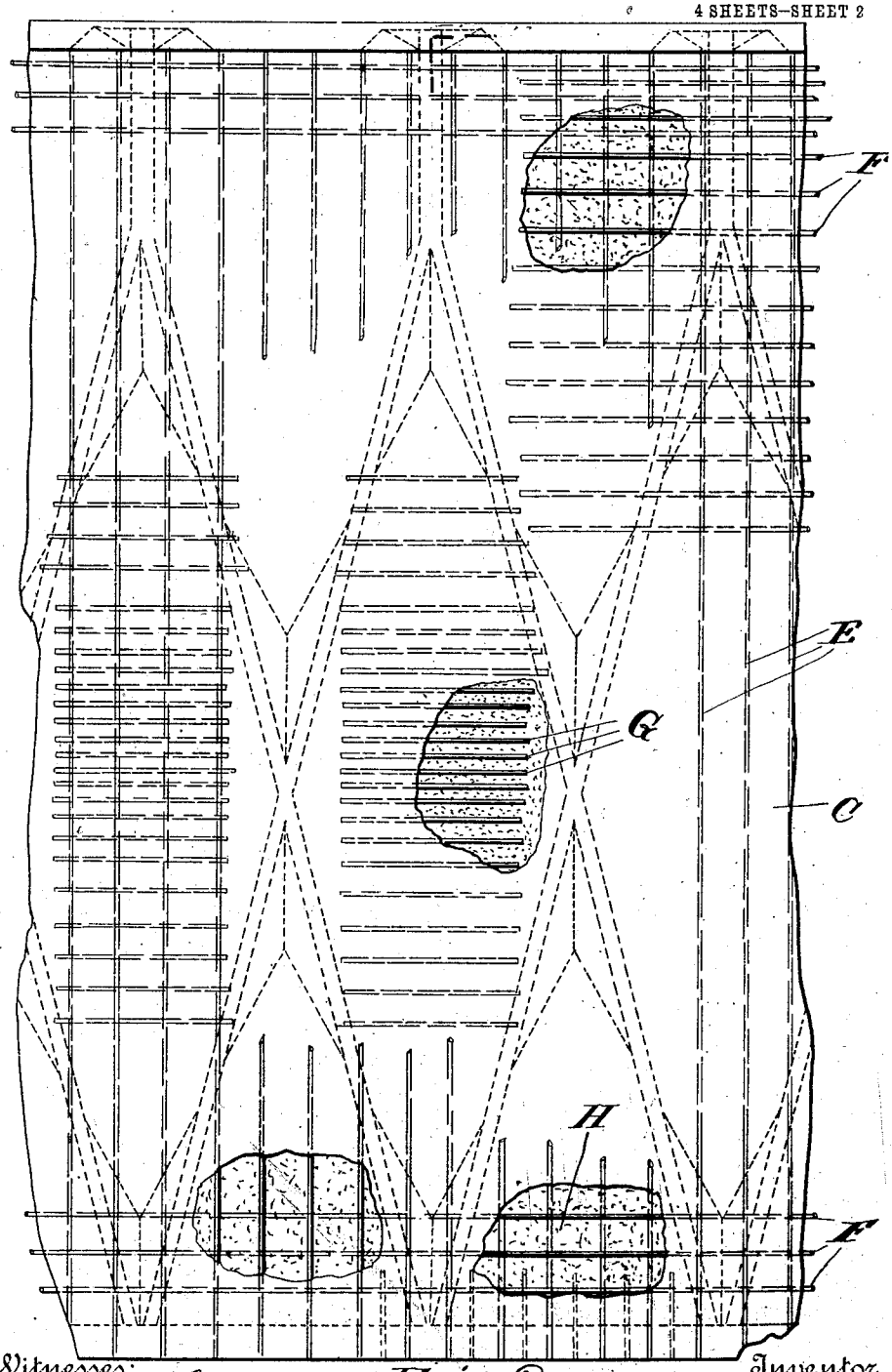

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Fig. 2.

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4 SHEETS—SHEET 3.

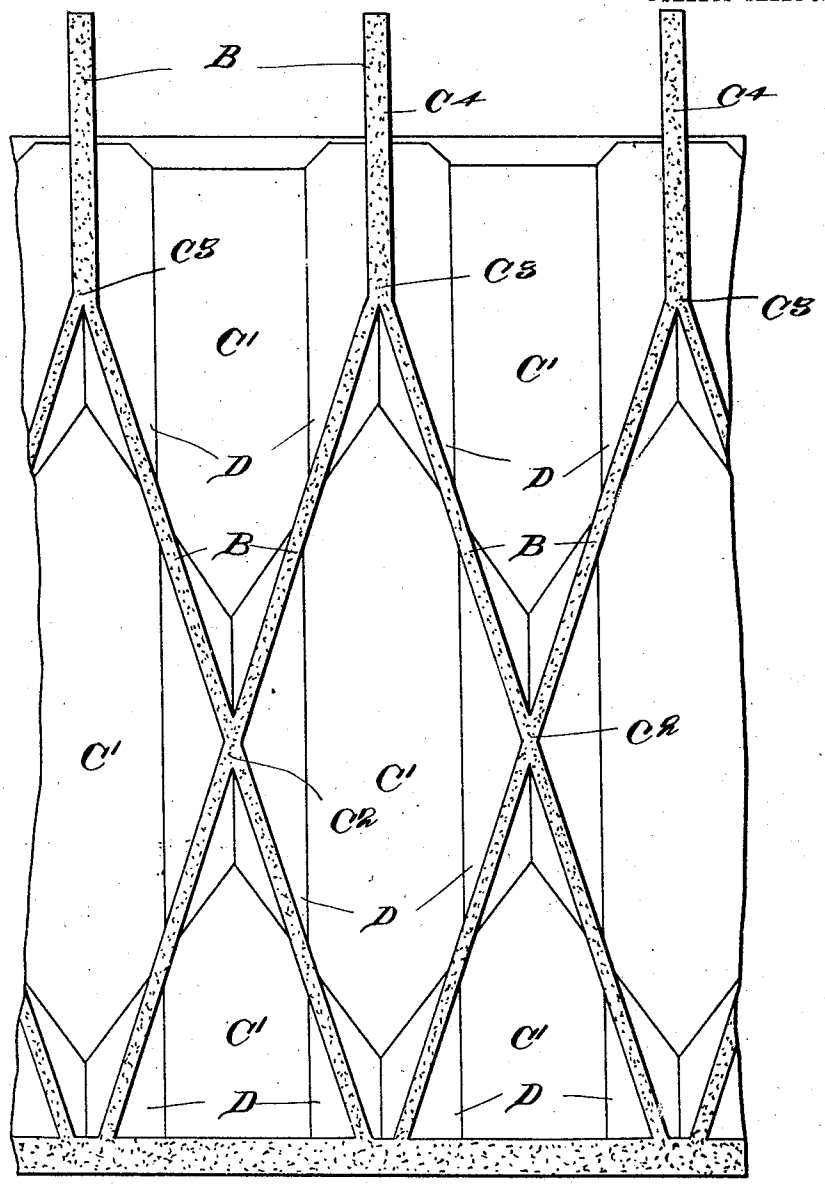

Fig. 5.

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4 SHEETS—SHEET 4.

Fig. 5.

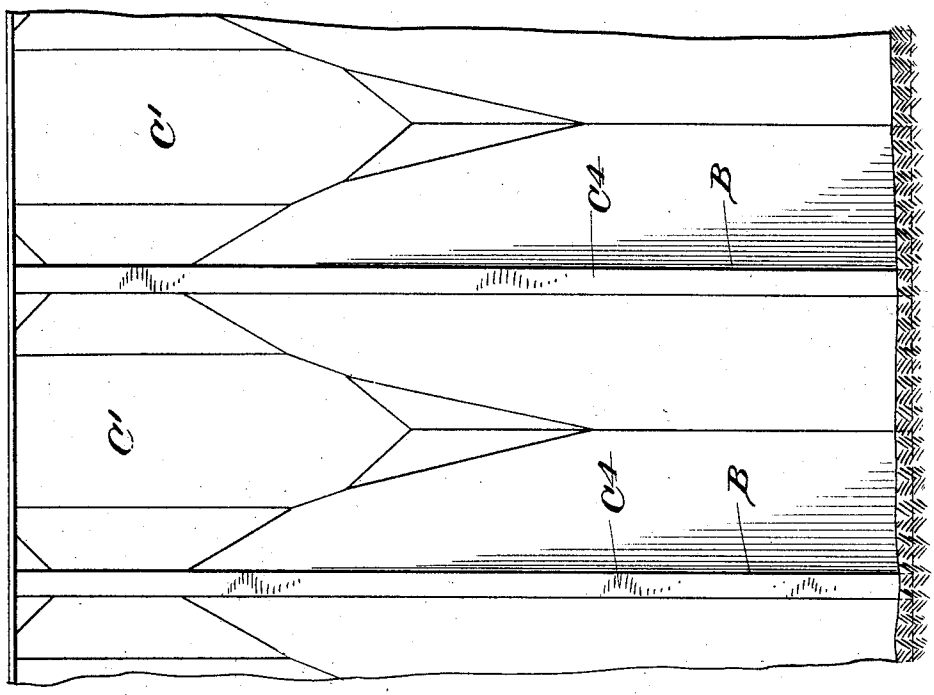
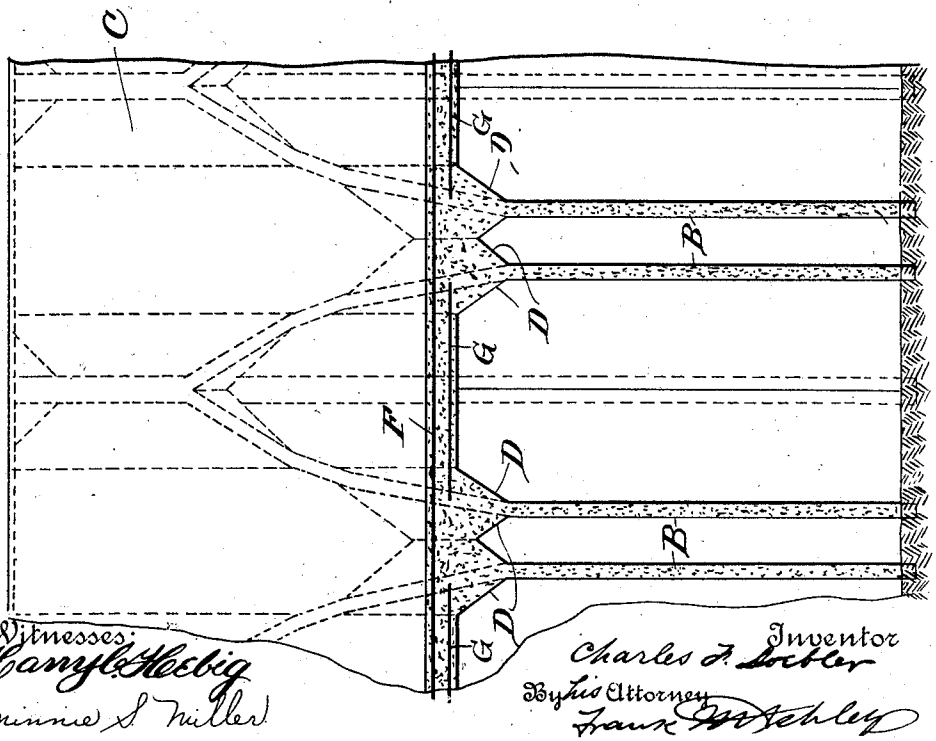


Fig. 4.



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UNITED STATES PATENT OFFICE.

CHARLES F. DOEBLER, OF NEW YORK, N. Y., ASSIGNOR TO NATIONAL HYDRAULIC CONSTRUCTION COMPANY, A CORPORATION OF NEW YORK.

DAM CONSTRUCTION.

1,010,602. Specification of Letters Patent. Patented Dec. 5, 1911.

Application filed October 11, 1910, Serial No. 586,582. Renewed October 11, 1911. Serial No. 654,249.

To all whom it may concern:

Be it known that I, CHARLES F. DOEBLER, a citizen of the United States, and a resident of New York city, in the county of New York and State of New York, have invented certain new and useful Improvements in Dam Constructions, of which the following is a specification.

My invention relates to constructions of concrete reinforced with metal, and has for its principal objects to adapt such construction for use for retaining-walls, dams, and the like.

My invention consists in the arrangements and combinations of parts, substantially as hereinafter described and claimed.

In the accompanying drawings which form a part of this specification, and wherein like symbols refer to like parts wherever they occur. Figure 1 is a vertical sectional elevation of a structure embodying my invention, and discloses a dam construction, the deck of which is formed at an angle to its base as illustrated. Fig. 2 is a plan view of a portion of the deck shown partly in section and discloses the method of reinforcing the same. Fig. 3 is an inverted plan view disclosing the arrangement of the buttresses. Fig. 4 is a portion of the deck shown partly in vertical section and illustrating the construction at the point where the deck and buttresses meet. Fig. 5 discloses a portion of the construction as it appears when viewed from the downstream side.

In practice the several portions of my construction will be built in one continuous mass of concrete by the use of molds or false work, as is usual in concrete construction.

The principal feature of my improvement consists in the arrangement of the reinforcement which consists of metal bars embedded in the slab-like deck in such a manner as to form a cantaliver construction when the deck is completed whereby the length of the bars which extend longitudinally of the deck may be made of comparatively short sections and may span a distance equal to or less than the distance between the supporting walls. In my construction I also embody the use of iron bars which are embedded in the deck and extend the entire width thereof, and by arranging my longitudinally extending bars both above and below the laterally extending bars I am able to provide a very solid construction which will resist the expansion and contraction due to the water either covering the deck or only partially covering the same, which is set up in all such structures where the same is exposed to hot and cold currents of air.

The dam shown comprises a base A which is shown as a natural base, but which if desired may be a constructed or artificial base, buttresses B, and a deck or flooring C, which may be provided with a spill-way if desired, and the under side of the deck C, is indicated by C'. The buttresses B are arranged at an angle to the flow of the stream and to each other and are arranged in lines which cross, so that the walls interlock at the points C^2 where they cross and also interlock at the points C^3 where they merge with a portion of the buttresses which extend in alinement with the flow of the stream which portion is indicated by C^4. The result of this arrangement of the buttresses is to form spaces between the same at the point where the deck is supported thereby, which spaces show the greatest width between the points C^2 where the walls join and which spaces greatly decrease in width as they approach the apex of the angle in each direction.

In order to save material, cost and time in construction it has been found that the walls or buttresses may be spaced, so that the distance across from the junction C^2 to the opposite junction C^2 may be considerably increased if the deck is properly reinforced with iron rods or by the use of corbels and metal or by the combination of both, and to this e d I have arranged for such reinforcement as follows:

In Figs. 3 and 4, I have shown the corbel construction arranged just under the deck C and indicated by D—D—D, etc., which corbels extend toward each other as clearly shown in Fig. 3, so that the span between the points C^2, C^2 is reduced to a certain extent.

The iron rods indicated by E—E—E, etc., extend the full width of the dam as illustrated in Fig. 1 and indicated in dotted lines in Fig. 2 and are spaced apart from each other throughout the entire length of the dam, but are shown broken off in the drawings in Fig. 2 so as not to cause confusion

in reading the drawing. The series of bars indicated by F—F—F, etc., are spaced apart from each other and extend the entire length of the dam and are located above the bars E. The bars indicated by G—G—G, etc., extend across the spaces between the walls to a point where they overlap the corbels as illustrated in Fig. 2, and are located below the bars E, and are spaced nearer together near the middle of the spaces than is required at the points where the said bars extend entirely across, so that the ends rest above the walls B.

The walls B may be spaced sufficiently near together so that the corbels will not be needed and in this case the bars G are extended almost entirely to the walls near the middle of the spaces and overlap the said walls near the ends of the spaces as illustrated in Fig. 2.

The bars G are perferably about one inch in diameter and are spaced apart from each other near the center of the span about six inches from center to center, but these measurements as to size and spacing will necessarily depend on the height of the dam and the pressure of water that the deck is to sustain, so that I do not wish to limit myself to the size or relative spacing of the bars as to distance.

By the relative arrangement of concrete and reinforcing means above pointed out, a construction can be produced which will successfully withstand the changes of temperature, and the walls may by this system be spaced a considerably farther distance apart where a dam is used without such reinforcement.

It will be observed that by reason of the fact that the rods F are run the entire length of the dam and the rods E run the entire width thereof, that a complete crosswork is provided at all points in the deck where the distance between the reinforcement comprises a small rectangular space indicated by a square H in Fig. 2, and that the spaces between the walls where further reinforcement is necessary is supplied by the rods G—G—G, etc., and that by this arrangement of rods a complete cantaliver construction is provided in the deck.

Since the pressure of water is less near the top of the dam than nearer the bottom thereof, it has been found unnecessary to extend the V-shaped walls the entire width of the dam, and I, therefore, arrange to have the walls B—B merge together and form one continuous wall from the point C^3 to the rear end of the buttresses, and by this construction I am able to reduce the amount of concrete which will be necessary without the walls extended separately to the ends of said abutments as will be readily understood.

In order to provide for the escape of water from between the walls in case any should by accident find its way either through or beneath the front wall of the deck, I provide a series of arched openings or holes near the base of the dam indicated in Fig. 1 by I and which will permit of a person entering said spaces for the purpose of inspection.

Having thus described my invention what I claim as new is:

1. A hollow gravity dam embodying buttresses and a deck formed integral therewith, and having a series of reinforcing rods extending longitudinally thereof and embedded therein and a series of reinforcing rods extending across said first rods, and corbels formed integral with said deck and buttresses.

2. A hollow gravity dam embodying buttresses arranged at an angle to the flow of the stream and being joined at their points of intersection and having corbels extending along the top of said buttresses, and a deck formed integral with said buttresses and corbels.

3. A hollow gravity dam embodying buttresses formed of concrete material and having corbels mounted thereon near the top thereof, and a deck formed integral with said buttresses and corbels.

4. A hollow gravity dam embodying buttresses formed of concrete material and having corbels mounted thereon near the top thereof, a deck formed integral with said buttresses and corbels, and longitudinally extending rods embedded in said deck and extending the length thereof.

5. A hollow gravity dam embodying buttresses formed of concrete material and having corbels mounted thereon near the top thereof, a deck formed integral with said buttresses and corbels, longitudinally extending rods embedded in said deck and extending the length thereof, and series of rods extending across the width of said deck.

6. A hollow gravity dam embodying buttresses formed of concrete material and having corbels mounted thereon near the top thereof, a deck formed integral with said buttresses and corbels, and series of rods extending across the width of said deck.

7. A hollow gravity dam embodying buttresses arranged at an angle to the flow of the stream and having corbels mounted thereon near the top thereof, a deck formed integral therewith and having a series of reinforcing rods extending longitudinally thereof and embedded therein and a series of reinforcing rods extending across said first rods.

8. A hollow gravity dam embodying buttresses formed of concrete material arranged at an angle to the flow of the stream and being joined at their points of intersection and having corbels mounted thereon near the top thereof, a deck formed integral

with said buttresses and corbels, and series of rods extending across the width of said deck.

9. A hollow gravity dam embodying buttresses formed of concrete material arranged at an angle to the flow of the stream and being joined at their points of intersection and having corbels mounted thereon near the top thereof, a deck formed integral with said buttresses and corbels, series of rods extending arcoss the width of said deck and longitudinally extending rods embedded in said deck and extending the length thereof.

10. A hollow gravity dam embodying buttresses formed of concrete material arranged at an angle to the flow of the stream and being joined at their points of intersection and having corbels mounted thereon near the top thereof, a deck formed integral with said buttresses and corbels, series of rods extending across the width of said deck and longitudinally extending rods embedded in said deck and extending the length thereof, and having a series of reinforcing rods extending from the corbel of one wall to the corbel of the opposite wall.

11. A hollow gravity dam embodying buttresses formed of concrete material and having corbels mounted thereon near the top thereof, a deck formed integral with said buttresses and corbels, and a plurality of rods extending across the space between the buttresses from corbel to corbel.

12. A hollow gravity dam embodying buttresses and a deck formed integral therewith, and having a series of reinforcing rods extending longitudinally thereof and embedded therein and a series of reinforcing rods extending across said first rods, and corbels formed integral with said deck and buttresses, and a plurality of rods extending across the space between the buttresses from corbel to corbel.

13. A hollow gravity dam embodying buttresses and a deck supported thereby and having a series of reinforcing rods extending longitudinally thereof and embedded therein and a series of reinforcing rods extending across said first rods, and corbels mounted on said buttresses and distributing to support said deck.

14. A hollow gravity dam embodying buttresses arranged at an angle to the flow of the stream and having corbels mounted thereon near the top thereof, a deck formed integral therewith and having a series of reinforcing rods extending longitudinally thereof and embedded therein and a series of reinforcing rods extending across said first rods, and a series of shorter rods extending across the spaces between the buttresses from corbel to corbel.

15. A hollow gravity dam embodying buttresses formed of concrete material arranged at an angle to the flow of the stream and being joined at their points of intersection and having corbels mounted thereon near the top thereof, a deck supported by said buttresses and corbels, series of rods extending across the width of said deck and longitudinally extending rods embedded in said deck and extending the length thereof, and having a series of reinforcing rods extending from the corbel of one wall to the corbel of the opposite wall, and a series of shorter rods extending across the spaces between the buttresses from corbel to corbel.

16. A hollow gravity dam embodying buttresses formed of concrete material and having corbels mounted thereon near the top thereof, a deck supported thereby, and series of rods extending across the width of said deck.

Signed at New York city, in the county of New York and State of New York, this 26th day of August A. D. 1910.

CHARLES F. DOEBLER.

Witnesses:
FRANK M. ASHLEY,
MINNIE S. MILLER.