

(No Model.)

E. R. BEARDSLEY.
GRAVITY DAM.

No. 536,453.

Patented Mar. 26, 1895.

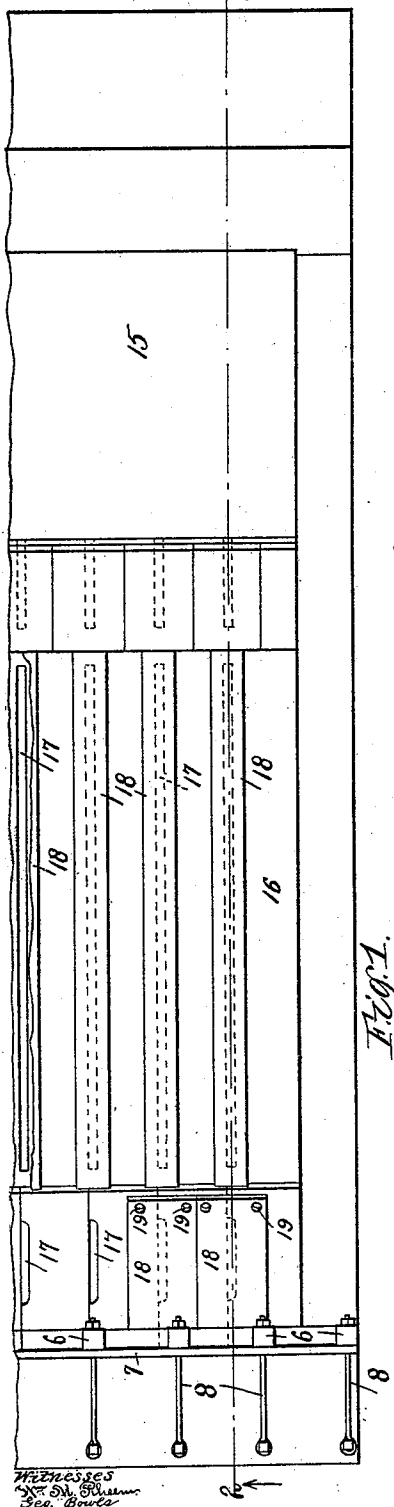
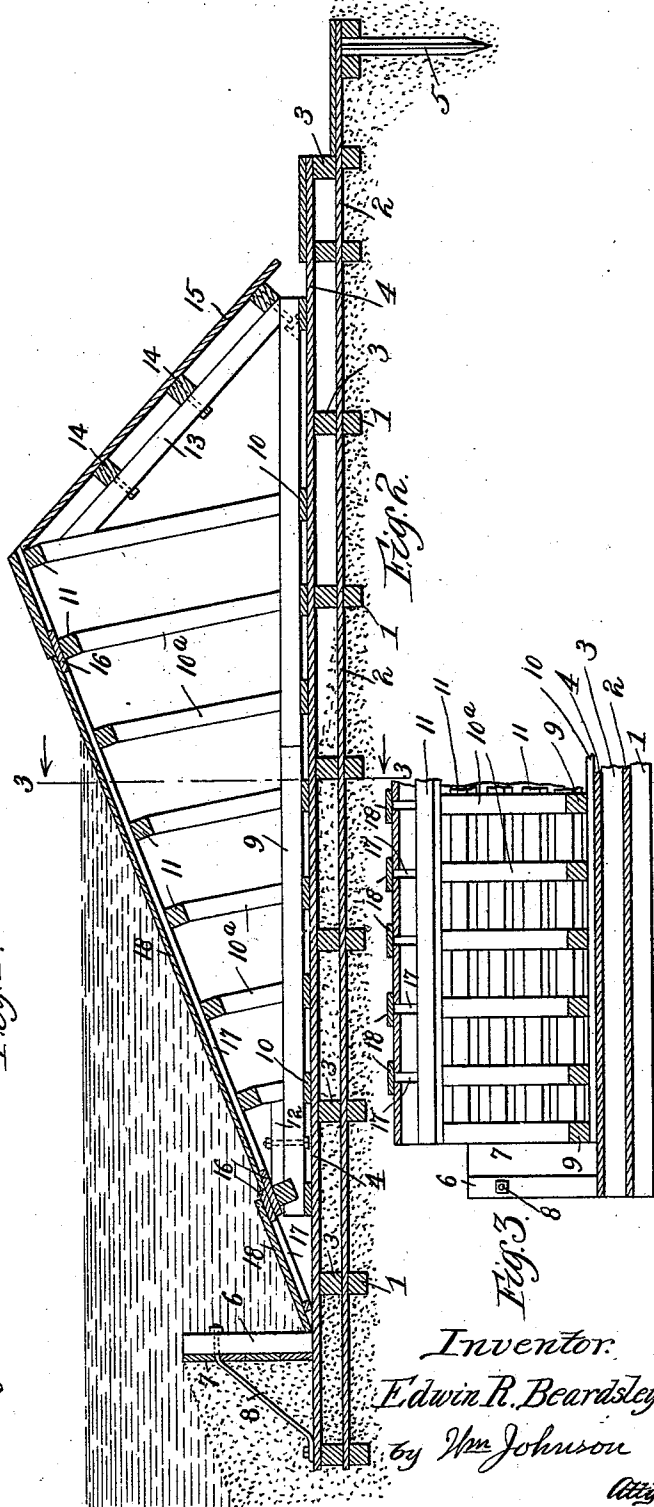


Fig. 1.



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UNITED STATES PATENT OFFICE.

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GRAVITY-DAM.

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To all whom it may concern:

Be it known that I, EDWIN R. BEARDSLEY, a citizen of the United States, residing at Waldron, in the county of Kankakee and State of Illinois, have invented certain new and useful Improvements in Dams; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

My invention relates to improvements in the construction and erection of fixed or permanent dams for obstructing the flow of streams and rivers, and to confine and raise the waters therein.

The object of the invention is to provide a cheaply constructed and efficient dam adapted to be expeditiously erected and permanently maintained at small cost for repairs.

To this end the invention consists substantially in a foundation or mat composed of timber and plank firmly embedded in the bottom or bed of the stream its full width, and which is provided with a vertically projecting breastwork secured thereto, of about one half the normal height of the dam. Said breastwork supports earth materials filled in against it and sloping downward from its top up-stream to the natural bed of the stream. The dam is built to rest upon the foundation-mat below the breastwork, and is secured thereto solely by its own gravity and that of the superincumbent mass of water, it being an essential feature of the invention that no mechanical or other attachment is formed between the dam superstructure and foundation-mat save that of gravity so that the superstructure is capable of being moved up or down stream upon the foundation-mat, without disturbance or injury thereto. The planks covering the dam are also made water tight and secured to the timber-work mainly by means of gravity, and in fact, the stability of the structure and its resistance to lateral pressure is dependent upon the force of gravity, for which reason I denominate my invention "the gravity dam."

The novel combination, construction and arrangements of parts by which the invention is made effective will be hereinafter fully described and set forth reference being had to the accompanying drawings, in which—

Figure 1 is a plan view of my improved dam. Fig. 2 is a vertical section taken on the line

2. 2. of Fig. 1, and Fig. 3 is a transverse section taken on the line 3. 3. of Fig. 2.

Referring to the drawings: 1 designates the several courses of string-pieces or mud-sills, which are laid end to end and extend across the stream the full width of the channel, being placed longitudinally from three to four feet apart, and are firmly embedded in the bottom or bed of the stream, their top surfaces being taken as the normal plane thereof. Said mud-sills are of timber and in size and number as is required to form a substantial foundation proportioned to the height of dam to be supported thereon, and to the width of the stream. Said mud-sills when thus laid and compacted about are covered over with plank 2, upon which a second series of string-pieces or sills 3, are laid directly over the mud-sills, and across the stream in like manner therewith, the spaces between which are also filled with earth material and covered over with plank 4, the whole being rigidly secured together and constituting the dam foundation or mat, the down stream or tail end of which is supported upon sheet piling 5. Said foundation-mat has erected thereon and firmly secured thereto, near its up-stream end, a vertically projecting breastwork, formed of posts 6 and plank 7, held laterally by the diagonal bolts 8. Said breastwork projects upward to about one half the normal height of the dam and is filled in against with earth material sloping from its top downward to the stream-bed, by means of which the foundation is made secure against wash-out or leakage. The wing-walls or shore abutments are built to rest upon the ends of the foundation-mat, and may be of any suitable or desired construction and material.

The construction of the framing or timber-work for the dam superstructure will be readily understood from an inspection of the vertical section shown in Fig. 2, in which one bent or section is shown, consisting of a base piece or sill 9, attached to plank 10, which rest loosely upon the top of the mat. Upon said base pieces posts 10^a are erected set bracing, the tops inclining up-stream, and to the tops of said posts stringers 11 are secured, which connect and tie all the bents and posts of the superstructure together, the lowest one of said stringers being secured directly to the upper ends of the base-pieces to which, be-

tween said lowest stringer and adjacent post, a strip 12, is bolted to stiffen and strengthen the structure at that point. The overflow or tail-end of the superstructure is formed by the braces 13, and stringers 14, to which the tail planks 15 are secured.

The novel feature in the detail construction of the superstructure, resides mainly in the covering-planks 16 and the means by which they are adapted to be held and made tight to retain and dam the water.

Heretofore the planking for dams has been bolted, nailed or spiked to the timber work, batten boards being spiked over the joints of the planks to prevent leakage thereat, but this construction has proved to be faulty and non-effective, for the reason that, from various causes, such as settling, warping, and the lodgment of ice and driftwood, the planking and boards become loosened, causing leakage and loss of water, making frequent repairs necessary. This difficulty is obviated and overcome in my invention by forming openings 17 in the cover-planking or by spacing the planks apart—shown in full lines by removing or breaking away the batten plank 18 and also by dotted lines. (See Fig. 1.) Said openings or spaces do not extend over the stringers upon which the planks are laid but are filled in, or not formed at that point and under the ends of the batten plank to prevent leakage thereat. By this arrangement of an opening underneath the batten plank, and open space beneath the whole planking, the buoyancy of the water can not operate to lift the planking, and it will therefore be held and secured to the frame work and made tight by the whole effective weight and pressure of the water, and in consequence thereof will require but slight nailing, and will have freedom to follow any settling or movement of the dam without leakage being caused thereby.

From the foregoing description of my improved dam its practical utility and advantages will now be seen.

It may be said with reference to dams in general that so long as the foundation remains in tact the effectiveness of a dam will not be disastrously or seriously impaired, and that it is only by destroying the foundation that the injury becomes irreparable.

In my invention the integrity of the foundation is secured by its large surface area embedded in and loaded with earth material, and with the water-weighted superstructure, reinforced by the breastwork erected thereon, and the absence of lateral pressure, as it will be noticed that the water pressure upon the upper side of the breastwork is equalized by that upon the opposite side. It is true that the foundation must sustain the lateral pressure due to the height of water, the superstructure being held by friction thereon, but little or no extraneous force can be added thereto such as the forming and expansion of ice and lodgment of driftwood, as the superstructure, not being bolted or in any

manner connected thereto—except by gravity or weight—is free to slide thereon, the force required for which is not sufficient to disturb the foundation-mat.

With regard to the superstructure of the dam—by which it is meant to distinguish the lateral pressure sustaining portion from the foundation-mat—it has been found in practical operation that from the causes before mentioned, the superstructure does, in course of time, get moved down stream somewhat and is required to be put back to its normal position upon the foundation. This is done by leaving the lower batten plank wholly without nail attachment to the cover plank, and in providing them with perforations 19 adapted for the insertion of a hook-rod, by means of which a sufficient number of them may be pulled up the dam incline to uncover the spaces underneath and lower the water down to the height of the breastwork, the superstructure being then free to be moved to its original position.

The outline of the superstructure is that of a scalene triangle, the resisting angle being about twenty two and a half degrees from a horizontal, giving a perpendicular pressure two and a half times that of the lateral pressure, and in practice this proportion has been found to give ample security and satisfactory results. I do not, however, desire to restrict my invention to the exact form or proportion and details of construction, or to the use and kind of materials specified herein, but reserve the right to make such changes therein as are not at variance with the spirit of the invention.

Having thus described my invention, I claim—

1. The combination in a dam structure of a cover-planking spaced apart or formed with openings as described, and batten boards or planking laid upon said cover-planking over said spaces or openings; said openings adapted for the purpose of causing a gravity pressure of water to be thrown upon said batten boards to hold them firmly against said cover-planking, and to prevent them from being lifted or floated therefrom by the buoyant effort of said water, substantially as specified.

2. In a dam structure the combination of a foundation-mat formed or composed and laid as described, and provided with a breastwork erected thereon and rigidly secured to said mat, and a dam superstructure built as described, to rest upon said foundation-mat, and adapted to be held thereon to resist and sustain the lateral pressure of the impounded water by the gravity or weight of said impounded water supported upon said superstructure substantially as specified.

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

EDWIN R. BEARDSLEY.

Witnesses:

SWANTE P. LARSON,
EDWARD S. CURTIS.