No. 878,291. PATENTED FEB. 4, 1908.

E. B. JENNINGS.

SHELL DAM.

APPLICATION FILED OCT. 21, 1907.

Fig. 1.

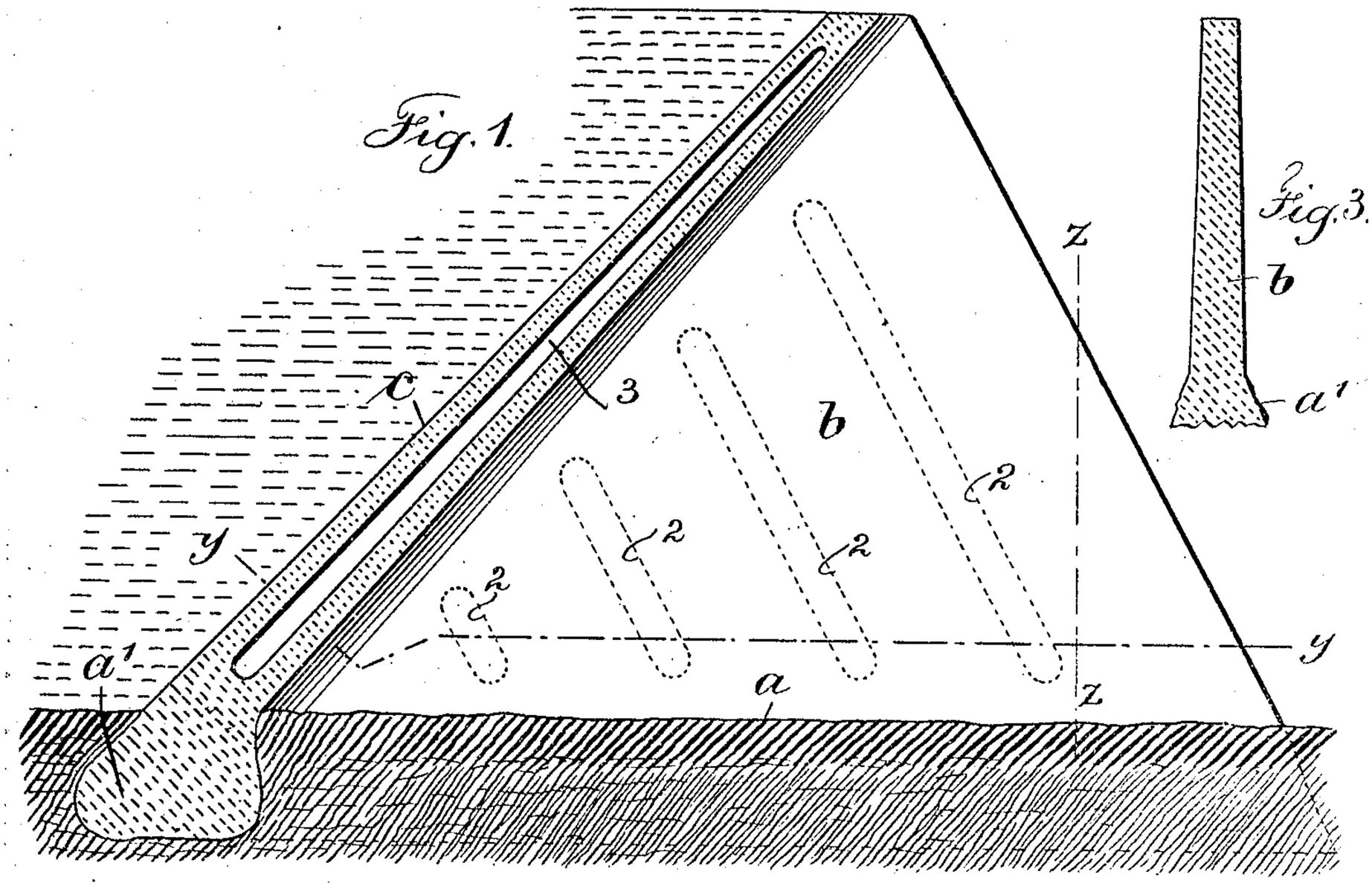

Fig. 3.

Fig 2.

Witnesses

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SHELL-DAM.

No. 878,291. Specification of Letters Patent. Patented Feb. 4, 1908.

Application filed October 21, 1907. Serial No. 398,356.

To all whom it may concern:

Be it known that I, EDWIN B. JENNINGS, a citizen of the United States, residing at the borough of Manhattan, in the city, county, and State of New York, have invented an Improvement in Shell-Dams, of which the following is a specification.

My invention relates to an improvement in dams of the plain or reinforced kind, with the object of producing a structure of maximum strength and minimum weight, thus effecting economy of materials without the sacrifice of efficiency.

In carrying out my invention, I provide a series of buttress piers set parallel with one another and spaced apart a suitable and predetermined distance, and inclined walls formed integrally therewith and arched between and transversely of the lines of the buttress piers and toward the impounded water. Within these walls I provide series of longitudinally disposed circular cavities and within the buttress piers I provide series of vertically disposed and slightly inclined circular cavities which reduce the amount of material employed and the weight without detracting from the strength or rigidity. This construction permits of a thicker wall and thicker buttress piers and consequently a greater area of foundation bearing. The form of the under earth or rock foundation, the manner of connecting the walls and buttresses thereto, or the angle of inclination of the wall or opposite edge of the buttress piers forms no part of my invention.

In the drawing, Figure 1 is a vertical cross section and partial elevation at the dotted line *x*, *x*, Fig. 2. Fig. 2 is a horizontal section at the dotted line *y*, *y*, Fig. 1, and plan of the ground line of the inclined walls and buttress piers, and Fig. 3 is a vertical section in smaller size of one buttress pier at the dotted line *z*, *z*, Fig. 1.

In the drawing, *a* represents the earth or rock bed which is to be suitably excavated to any desired depth and also in any desired manner for a suitable foundation a^1 upon which the buttress piers *b* and the inclined integral walls *c* are to be erected and by which they are to be supported.

The buttress piers *b* are of the desired thickness and set parallel to one another where the shell dam is to be in line and they are suitably spaced apart at a predetermined distance, and the inclined walls *c* extend along corresponding edges of the buttress piers; they are formed integral with said buttress piers and are arched between and transversely of the lines of the buttress piers and toward the impounded water, the arches being sprung from the centers of the buttress piers as will be apparent from Fig. 2.

In the buttress piers *b* I provide series of cavities 2 vertically disposed and slightly inclined and in the inclined walls I provide other series of cavities 3 longitudinally disposed between the outer and inner surfaces of said inclined walls and running longitudinally, that is, from near the foot to near the top of the walls. These cavities reduce the amount of material employed and the weight of the buttress piers and walls without detracting from the strength of the same or the rigidity of the structure and they further make it possible to employ a thicker wall and thicker buttress piers. These cavities in cross section are of circular configuration and preferably of elliptical configuration as shown in the drawing, although I do not limit myself in this respect. These cavities are of larger area near the foot of the walls and buttresses and contract in area toward the top of the walls and buttresses. The buttresses are preferably wider at the lower parts near their foundations than at the top as shown in Fig. 3, on account of the increased bearing thereby provided, but I do not limit my invention in this respect.

From Fig. 2 it will be noticed that the outer up stream surfaces of the arched walls *c* are formed on a greater radius than are the inner surfaces between the buttresses with the result that the wall arches are thinnest at the center and thickest at the buttresses, thus strengthening and stiffening the arches without sacrifice of material. The elliptical configuration of the cavities which in any cross section taken thereof presents the form of an arch strengthens the shell between said cavities and the outer surfaces; the arch having a tendency to prevent a pressing strain. Furthermore this form of construction insures a greater area of foundation bearing, making it more difficult to un-seat the shell dam than would be the case if the foundation and walls were narrower. In both the buttress piers and the inclined walls the elliptical cavities in their longest dimensions are parallel with the central line of buttress piers or walls, therefore making it possible to use a medium size of wall rather than an extensive wall, which would be necessary if the cavities

were turned so that their longest diameters were at right angles to the line of the piers or walls. I do not limit myself to the proximity or number of these elliptical cavities nor to the kind or character of foundation employed for the shell dam, nor to the inclination of the walls or buttress piers. I further do not limit myself to constructing the shell dam according to my invention of plain or reinforced concrete, but I prefer to construct the buttress piers and the inclined walls so that they are integral.

I claim as my invention:

1. A shell dam comprising a series of buttress piers suitably spaced apart and inclined walls along one edge of said piers formed integrally therewith and arched between and transversely of the lines of the buttress piers and toward the impounded water, said buttress piers and inclined walls being constructed with series of circular cavities therein.

2. A shell dam comprising a series of buttress piers set parallel and spaced apart at a predetermined distance and inclined walls arched between and transversely on the lines of the buttress piers and toward the impounded water, with the arches sprung from the center of the buttress piers, the said buttress piers being each formed with series of elliptical cavities therein parallel with the outer edge of the buttress piers and the inclined walls formed with elliptical cavities therein in series running lengthwise from near the foot to near the top of the walls and all of said elliptical cavities arranged with the longest axis in line with the centers of the walls and piers.

3. A shell dam comprising a series of buttress piers set parallel and spaced apart at a predetermined distance and inclined walls arched between and transversely on the lines of the buttress piers and toward the impounded water, with the arches sprung from the center of the buttress piers, the said buttress piers being each formed with series of elliptical cavities therein parallel with the outer edge of the buttress piers and the inclined walls formed with circular cavities therein in series running lengthwise from near the foot to near the top of the walls.

4. A shell dam comprising a series of buttress piers suitably spaced apart and inclined walls along one edge of said piers formed integrally therewith and arched between and transversely of the lines of the buttress piers and toward the impounded water, said buttress piers and inclined walls being constructed with series of circular cavities therein and the buttress piers being wider at their lower foot portions than at the top.

5. A shell dam comprising a series of buttress piers suitably spaced apart and inclined walls along one edge of said piers formed integrally therewith and arched between and transversely of the lines of the buttress piers and toward the impounded water, the outer up stream surfaces of the arched walls being formed on a greater radius than are the inner surfaces between the buttresses whereby the arches thinnest at the centers are increased in thickness at the ends joining into the buttress piers.

6. A shell dam comprising a series of buttress piers suitably spaced apart and inclined walls along one edge of said piers formed integrally therewith and arched between and transversely of the lines of the buttress piers and toward the impounded water, the outer up stream surfaces of the arched walls being formed on a greater radius than are the inner surfaces between the buttresses, whereby the arches thinnest at the centers are increased in thickness at the ends joining into the buttress piers, and said buttress piers and inclined walls being constructed with series of circular cavities therein.

Signed by me this 14th day of October, 1907.

EDWIN B. JENNINGS.

Witnesses:

GEO. T. PINCKNEY,

E. ZACHARIASEN.