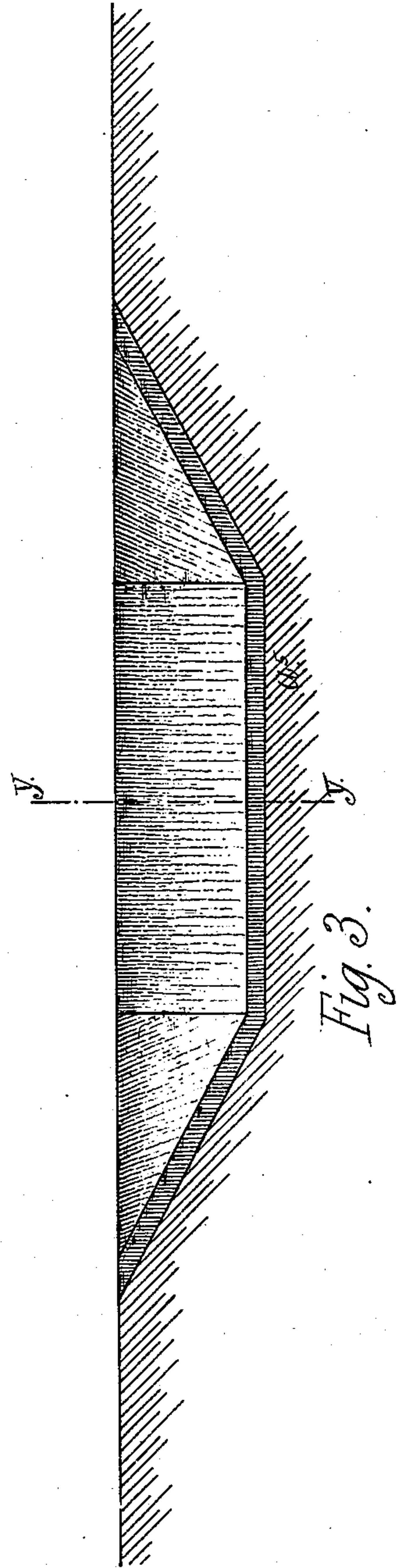
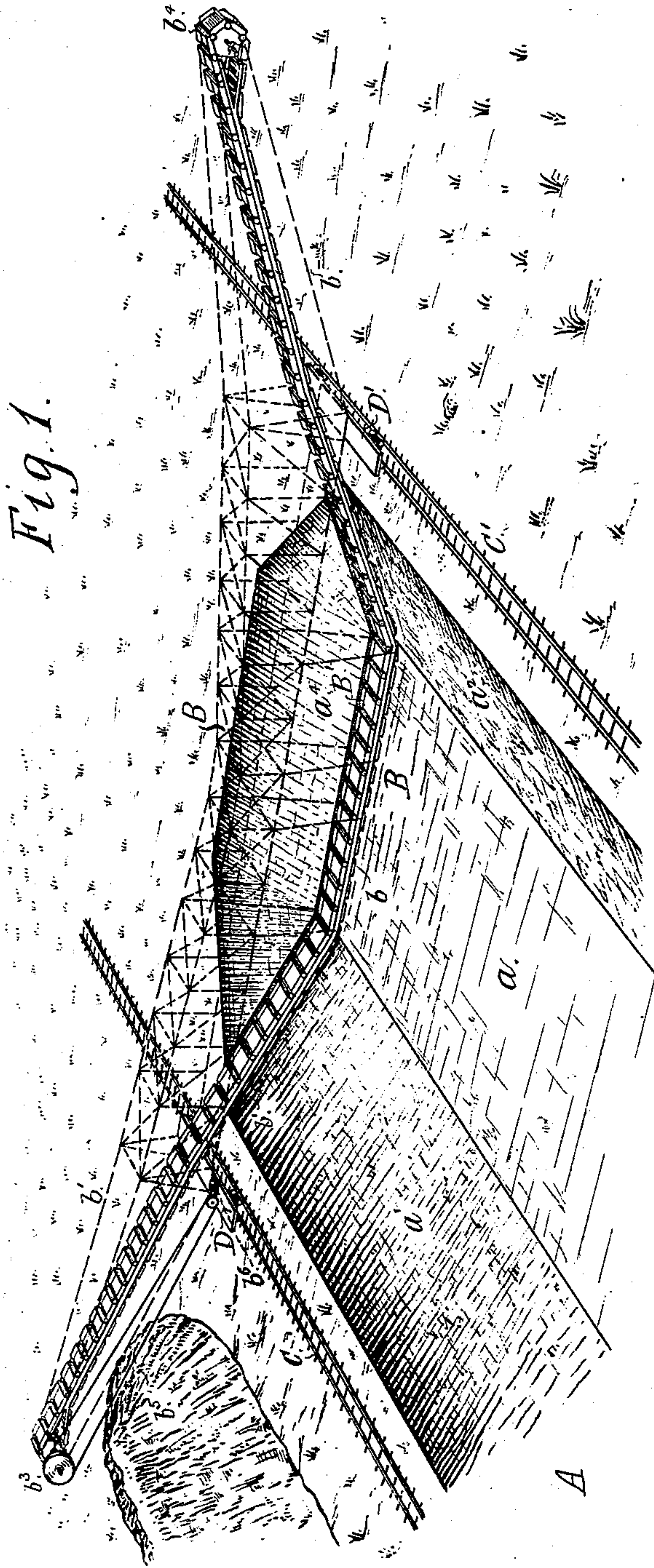


(No Model.)

4 Sheets—Sheet 1.

A. J. MASON.
METHOD OF MAKING ARTIFICIAL EXCAVATIONS FOR WATER COURSES, &c.
No. 532,679. Patented Jan. 15, 1895.



Witnesses
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(No Model.)

4 Sheets—Sheet 2.

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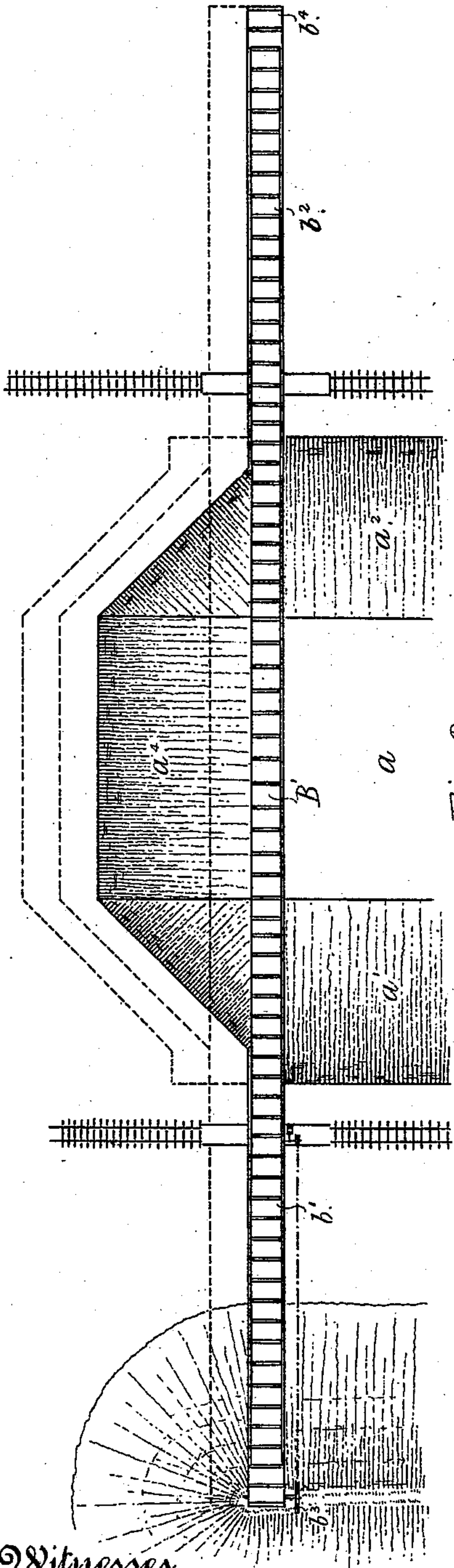


Fig. 2.

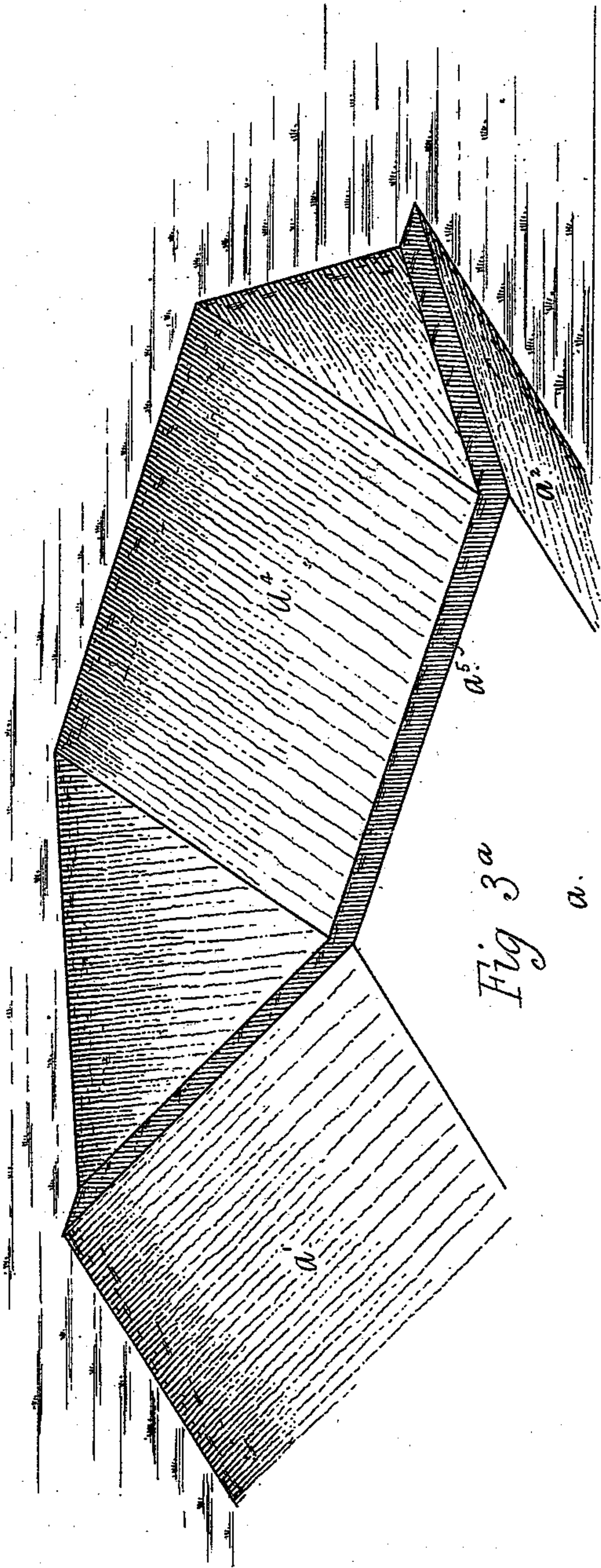


Fig. 3.

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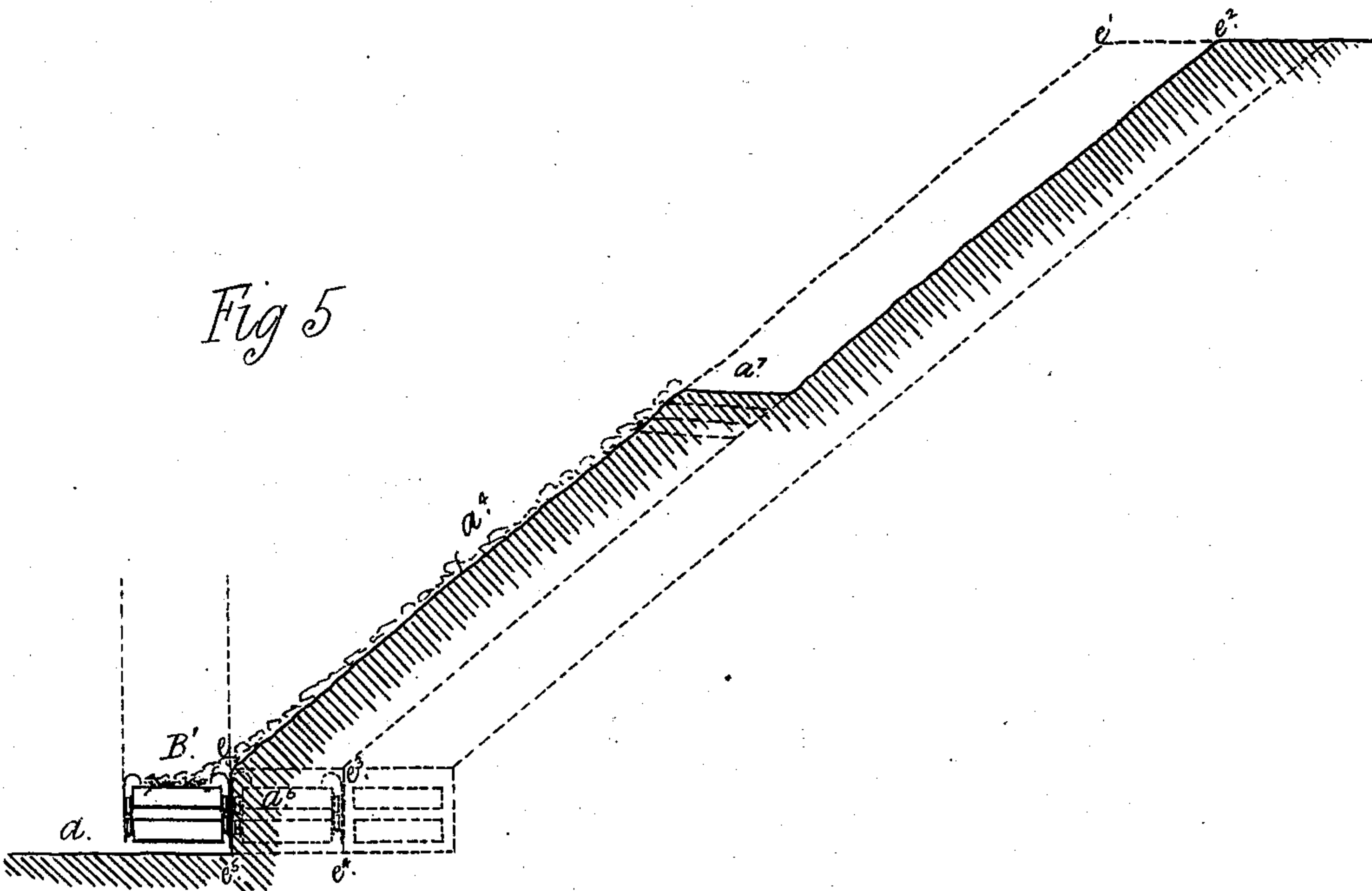
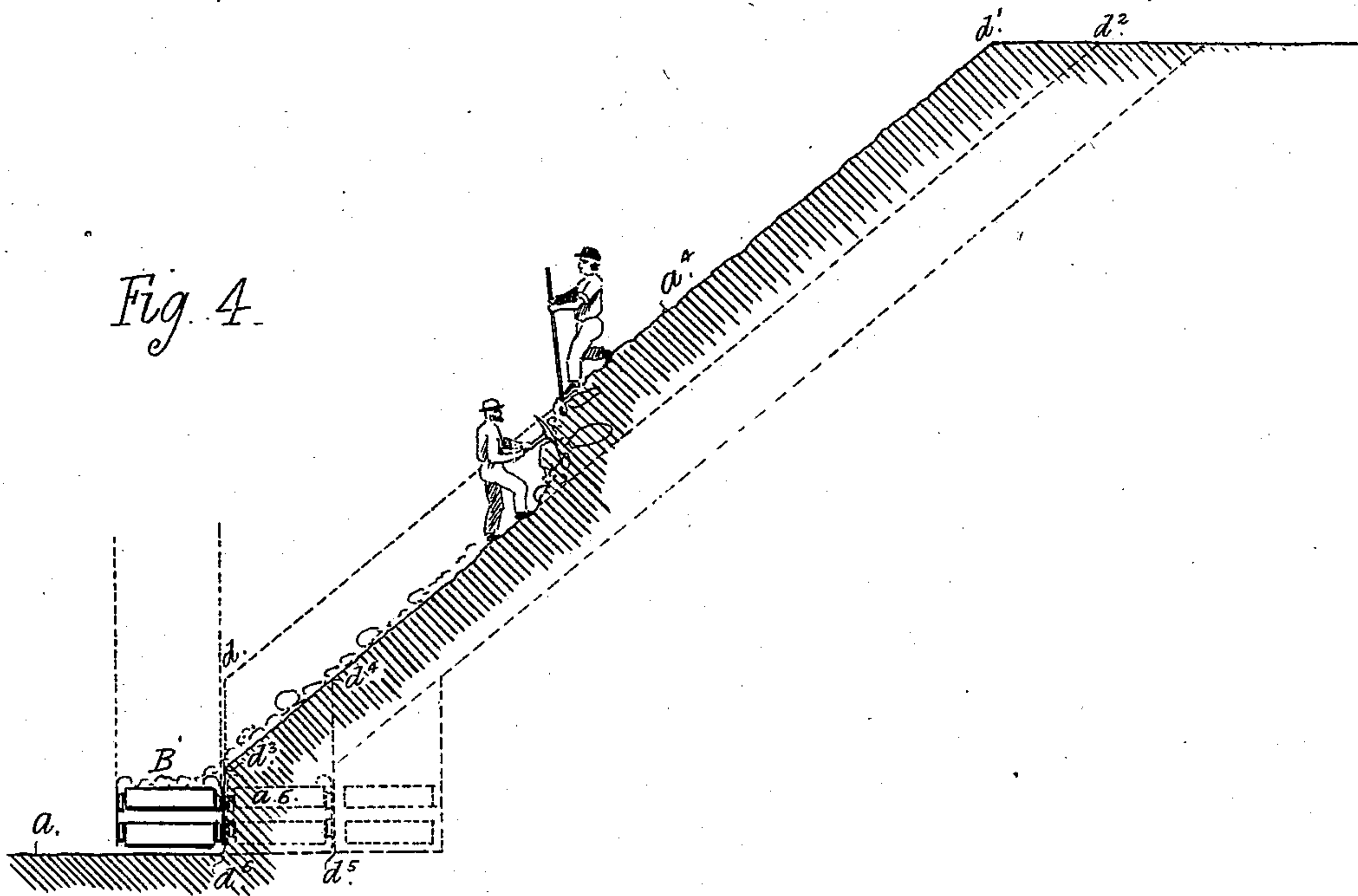
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4 Sheets—Sheet 3

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(No Model.)

4 Sheets—Sheet 4.

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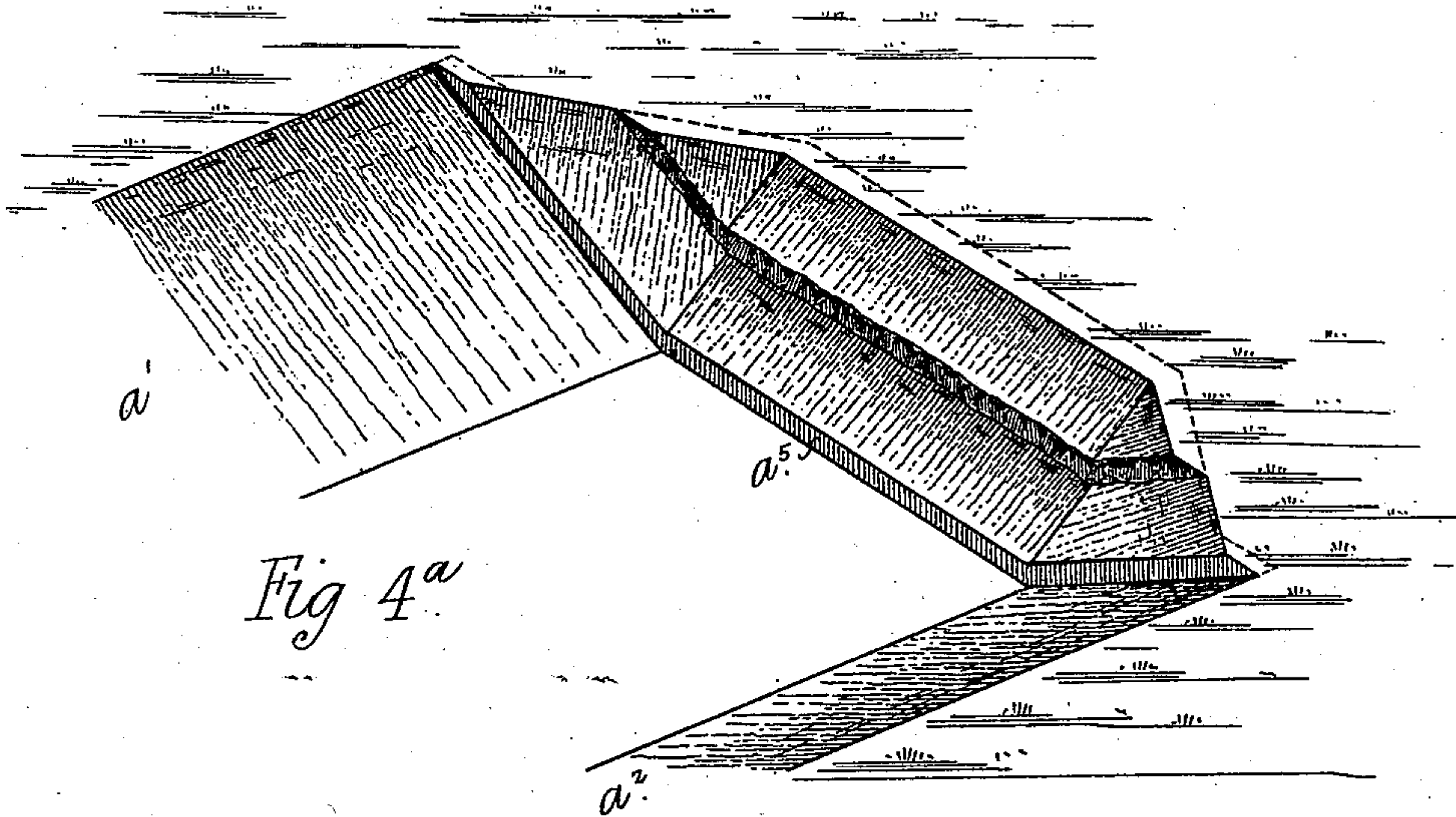


Fig 4^a

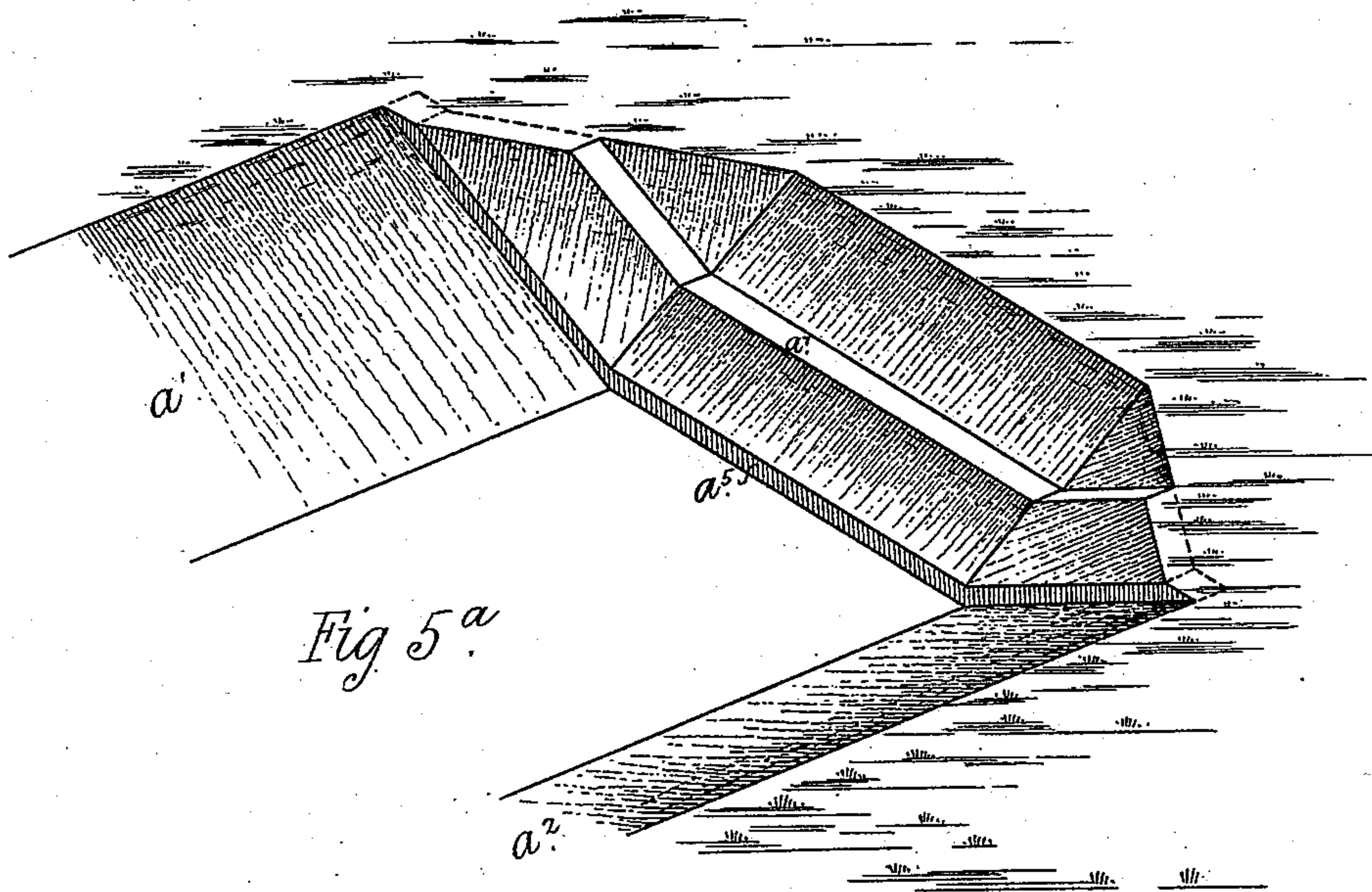


Fig 5^a

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UNITED STATES PATENT OFFICE.

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METHOD OF MAKING ARTIFICIAL EXCAVATIONS FOR WATER-COURSES, &c.

SPECIFICATION forming part of Letters Patent No. 532,679, dated January 15, 1895.

Application filed February 23, 1894. Serial No. 501,199. (No model.)

To all whom it may concern:

Be it known that I, ARTHUR J. MASON, a citizen of the United States, residing at Kansas City, in the county of Jackson and State of Missouri, have invented a new and Improved Method of Making Artificial Excavations for Water-Courses, Canals, &c.; and I do hereby declare that the following is a full, clear, and exact description thereof, reference being had to the accompanying drawings, forming a part of this specification.

The object of my invention is to improve the system or procedure in making artificial excavations, and it consists in the novel features and steps hereinafter described and specifically pointed out in the claims.

Referring to the drawings: Figure 1 is a view in perspective of an excavation for a canal showing an end face or slope, and also an endless conveyer at the bottom of the excavation and extending upwardly along its sides, and adjacent to the base of the end slope, and supported by trucks running on track rails at each side of excavation. Fig. 2 is a plan of the canal excavation showing the end face or slope and the conveyer adjacent thereto and the advanced lines of the end slope and conveyer. Fig. 3 is a cross section of the excavation for the canal showing the end face and its sectional parts and also the vertical face at the base of the end face and upon the sides of the excavation against which a part of the conveyer tracks come into contact. Fig. 3^a is a perspective view of the conformation of the end face. Fig. 4 is a sectional view of the end face or slope taken on line *y. y.* of Fig. 3, showing the material being dislodged by picks, bars, &c., and the conveyer adjacent to the base of the slope and the prisms of material to be deported from the end face or slope and base in degrees. Fig. 4^a is a perspective view of the conformation of the end face showing the form thereof when progressively loosening said end face by picking, &c. Fig. 5 is an alternate sectional view of the end face or slope taken from the line *y. y.* on Fig. 3 and showing the material removed from the surface downward toward the base from a series of benches. Fig. 5^a is a perspective view of the conformation of the end face and the form

when the method of plowing down on a bench is followed.

Similar letters of reference indicate corresponding parts in all the figures.

In carrying out my improved method, I first excavate the proper depth with the ordinary excavating devices so as to obtain the bed and establish its width. The sides of the excavation are then given a form or degree of inclination toward the bed, as may be desired, using the same means of excavating. In this manner I form a short section of a canal excavation as seen at A in Fig. 1 in which *a* is the bed, and *a'*, *a''* the respective sides. The end face, *a'* which extends in a transverse direction, is formed in this instance with a vertical face at the foot, extending completely across the end face and a suitable height, and also in a transverse direction to the axis of the canal excavation. From the upper edge of the vertical face, *a'*, a slope is made extending to the surface. This slope is maintained at an inclination greater than the natural angle of repose of the material when loosened, so that when loosened the material is subject to deportation by gravity. It will therefore, be seen by the longitudinal sections of the excavation for the canal through the end face, as in Figs. 4 and 5, that the end face in form is in two lines, a vertical face at the bottom of uniform height, and an upwardly inclined face extending to the surface.

Adjacent to the vertical face *a'*, of the end face, *a'* and extending upward along the sides *a'*, *a''* of the excavation and conforming thereto, is placed an endless or continuous conveyer, B'. The conveyer, as shown, is supported upon and below a trussed frame, B which extends transversely to the axis of the canal excavation. The upper ends of the portions *b*, *b'* of the frame B extend to a suitable distance above the surface and as far from the edges of the sides *a'*, *a''* of the excavation as is required to convey the material.

Upon the surface a short distance from the edge of the side *a'* of the excavation, and parallel therewith, is placed a track C, upon which is a car D. Upon the surface adjacent to the edge of the side *a''* of the excavation is a track C', upon which is a car D'. One end

b , of frame B of the conveyer is mounted upon the car D, and the other end b , upon the car D' and supported by said cars in such a manner as to elevate the frame B the requisite distance above the surface. The conveyer track and conveyer are suspended from the frame B across the excavation a sufficient height, above the bottom, a and the sides, a' , a'' of the excavation for the passage of the conveyers. The sprocket wheels b^3 , b^4 at the respective ends of the frame B carry the endless conveyer, and a power conveying band b^5 is employed to convey power from the engine b^6 on the car D to the shaft of the sprocket wheel b^3 .

The removal of the soil upon the slope a^4 depends upon the character of the material, and will be more readily understood by reference to Fig. 4, in which the material, when incapable of being plowed is attacked with picks, &c., and readily falls to the foot of the slope upon the conveyer. It will also be seen that a large amount of material lies above the conveyer between which and the bed of the excavation the conveyer is interposed. As seen in Figs. 4 and 4^a the detaching of the material is simply needed to enable the material to fall by gravity upon the moving conveyer, B. This material is detached by means of picks, shovels, bars, explosives, &c., and once loosened, falls upon the conveyer.

When the material extending across the end face a^4 has been removed to the proper depth, as shown in the contained prism, d , d' , d^2 , d^3 it is necessary to remove the prism of material d^3 , d^4 , d^5 , d^6 . This is done by ordinary grading processes and the material cast upon the conveyer. This being accomplished the conveyer is advanced in position as seen in dotted lines a^6 and against the new vertical face presented and the operation described repeated, the prisms of material upon the slope being removed, alternating with the removal of the prism at the foot of the slope.

The material as represented in Fig. 5 is such as can be plowed and presents an alternate condition for the removal to that shown in Fig. 4.

In the case of material which can be plowed, the end face is brought to the form shown in Figs. 5 and 5^a. A bench a^7 , preferably four to six furrows wide, is plowed down beginning at the surface, and the material thrown over the edge of the slope of the face a^4 in the manner shown in Fig. 5 which influenced by gravity falls upon the conveyer and is thereby transported as desired. The degree of lateral movement which is necessary to be given to the material loosened on said bench a^7 , is accomplished by the use of well-known grading tools, such as a road grader, which pushes the material laterally until it falls over the brink of the slope a^4 . When all the material within the prism e , e' , e^2 , e^3 is so removed the material in the prism e , e^3 , e^4 , e^5 is manipulated by ordinary grading tools and

cast upon the conveyer. The conveyer is then advanced to the dotted position shown a^6 and the process of plowing down the slope is repeated.

In the process described a saving of labor is accomplished in the construction of railroads, canals, and other engineering work, in which artificial excavation is required and the method is applicable to such excavations as require no reduction of the sides of the excavation but which may be retained in a vertical position.

Having fully described my invention, what I now claim as new, and desire to secure by Letters Patent, is—

1. The herein described method of making artificial excavations for canals, &c., consisting first in forming the end face of an excavation with a slope greater than the angle of repose of the material when loosened and then interposing between the bed of said excavation and the end face, a conveyer and then dislodging the material upon the end face and removing the foot of the end face in degrees and advancing the conveyer in position.

2. The herein described method of making an artificial excavation for canals, &c., consisting first in forming an end face of an incipient excavation with a slope greater than the angle of repose of the material when loosened, and then making a vertical face at the foot of the slope transversely to the axis of the excavation, and then dislodging the material upon the end face and then intercepting the downward progress of the dislodged material at the foot of the slope and conveying the material laterally across the line of the axis of the canal to the surface.

3. The herein described method of making artificial excavations for canals, &c., consisting first in forming the end face of an incipient excavation with a slope greater than the angle of repose of the material when loosened, then extending the end face upon the lines of interior angles at the surface, then dislodging the material upon the sectionally divided end face in degrees, and intercepting the dislodged material at the foot of the end face by a conveyer and conveying the material laterally as desired.

4. The herein described method of making artificial excavations for canals, &c., consisting first in preparing an incipient excavation at the bottom with a bed of suitable width, and inclining the sides at the proper angle to the bed, then forming an end face in the excavation upon the conformation of opposing angles described upon the surface and with a slope greater than the angle of repose of the material when loosened, making a vertical face at the foot of the slope transversely to the axis of the excavation, then dislodging the material upon the end face and intercepting the dislodged material at the foot of the slope, and conveying the material to the surface in

a direction corresponding to the vertical face of the slope.

5 The herein described method of making artificial excavations for canals, &c., consisting first in making a bed at the bottom of an incipient excavation, of the requisite width, then forming an end face with a slope greater than the angle of repose of the material when loosened, and then subdividing the material
10 to be removed upon the surface and upon the slope in prisms, corresponding with the degree of inclination of the end face and then dislodging the material composing each prism upon the slope in degrees and then intercepting and conveying the material at the foot of
15 the end face to the surface.

6. The herein described method of making artificial excavations for canals, &c., consisting first of making a bed at the bottom of an
20 incipient excavation of the requisite width, then forming the end face with a slope greater than the angle of repose of the material when loosened and then making a vertical face at the foot of the end face, then subdividing the material upon the surface and upon the slope
25 in prisms corresponding with the degree of inclination of the end face and then subdividing the foot of the slope in prisms corresponding with the described line of the vertical face and then dislodging the material in
30 the prisms upon the slope and then intercepting the dislodged material upon the slope and

conveying it to the surface, and then removing the prisms of material composing the vertical face at the foot of the slope as described. 35

7. The herein described method of making artificial excavations for canals, &c., consisting first in making a bed at the bottom of an incipient excavation of the required width and form, then forming the end face with a slope
40 greater than the angle of repose of the material when loosened, then making a vertical face at the foot of the end face interposing a conveyer between the bed and said vertical end face, then dislodging the material on the
45 end slope by plowing on a bench from the surface downward and moving the material laterally on said bench over the brink of the end slope.

8. The herein described method of excavating canals, which consists in opening a channel transverse to the axis of the proposed canal, forming a side of said channel to a slope
50 steeper than the angle of repose of the material when loosened, then loosening the material and delivering it down the slope onto a
55 conveyer arranged transversely to the line of the canal and delivering the material by said conveyer out of the excavation as set forth.

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