

No. 629,477.

Patented July 25, 1899.

C. F. STOWELL & A. C. CUNNINGHAM.
WALL.

(No Model.)

(Application filed Mar. 25, 1897.)

4 Sheets—Sheet 1.

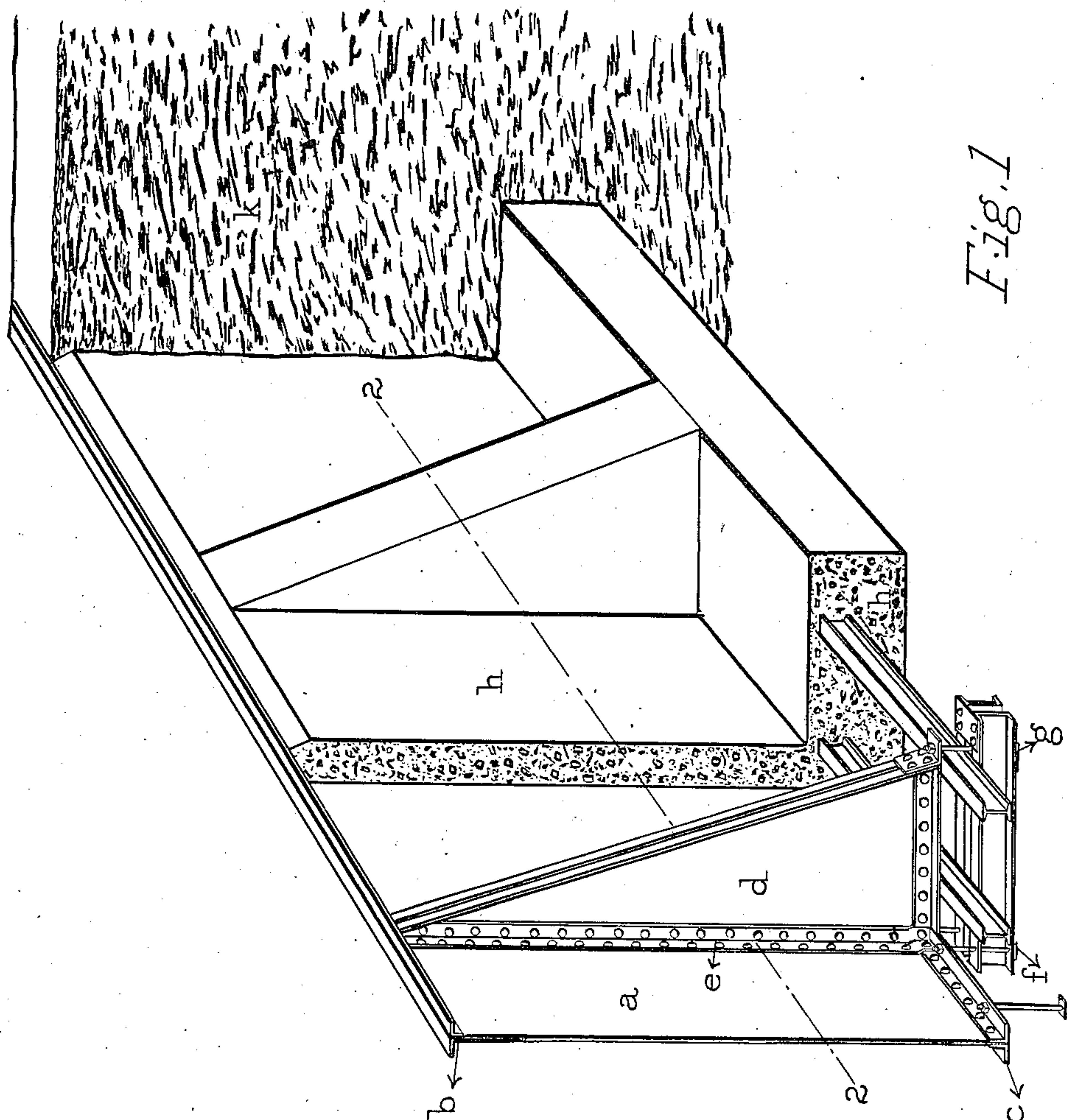


Fig. 1

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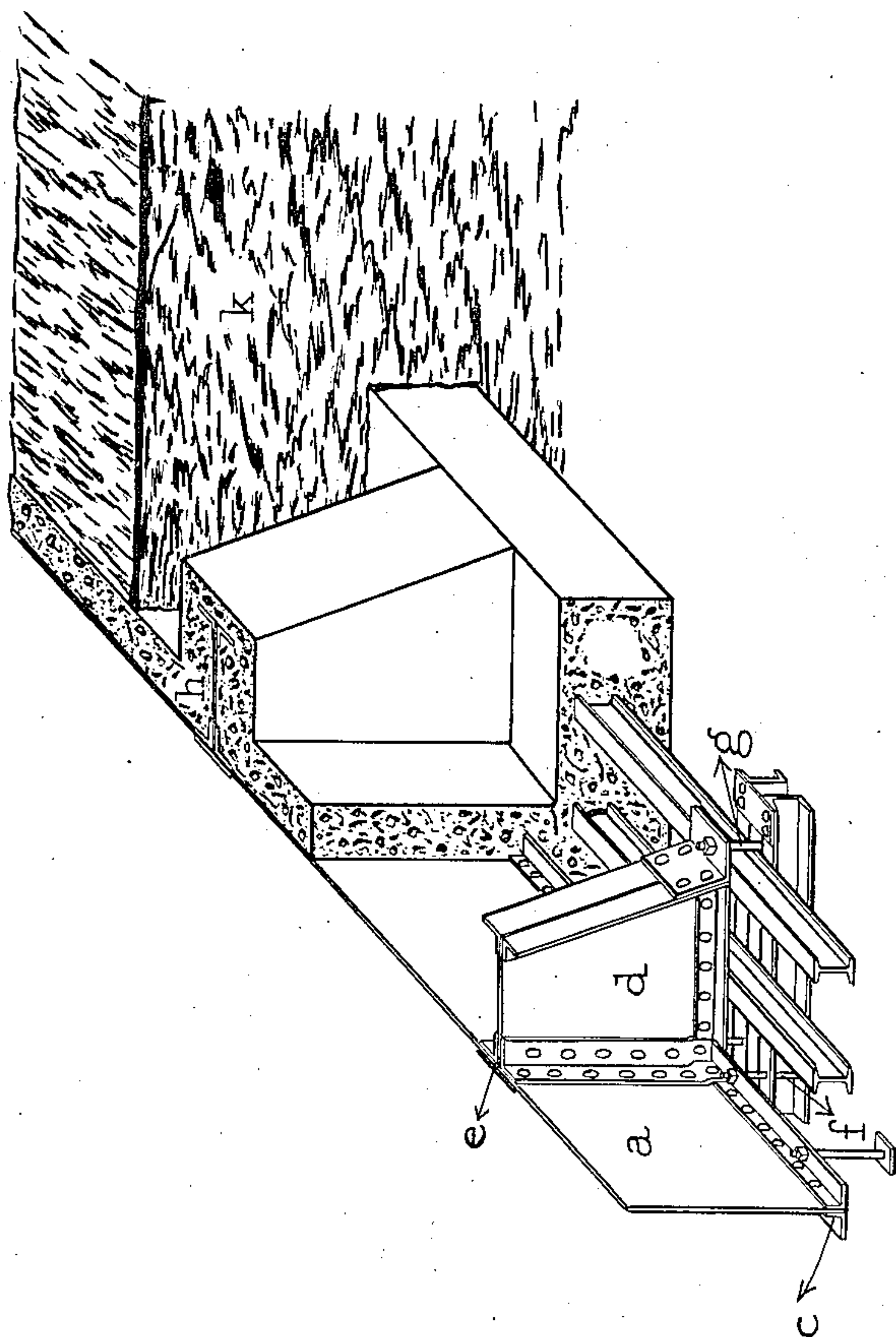


Fig. 2

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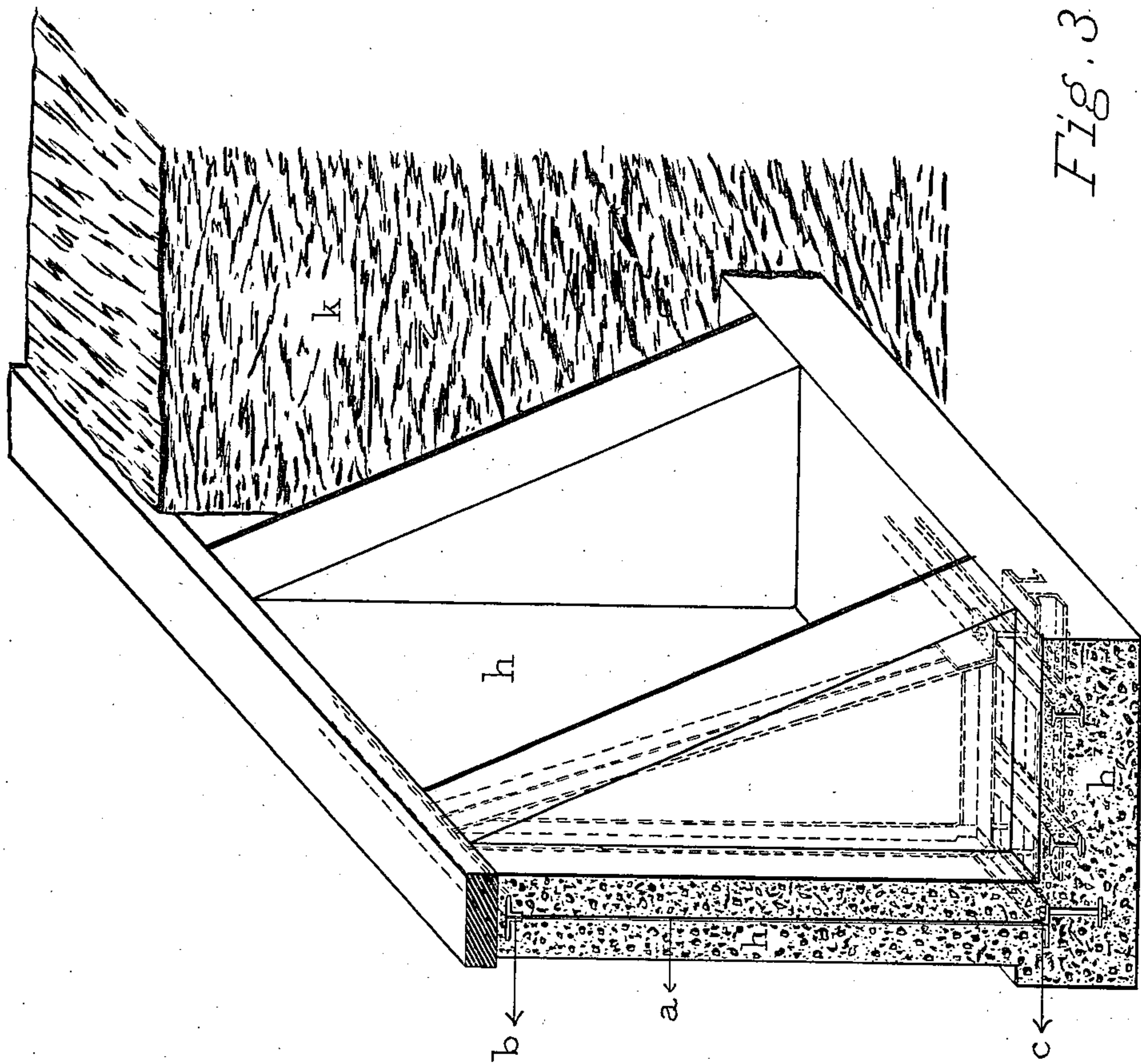
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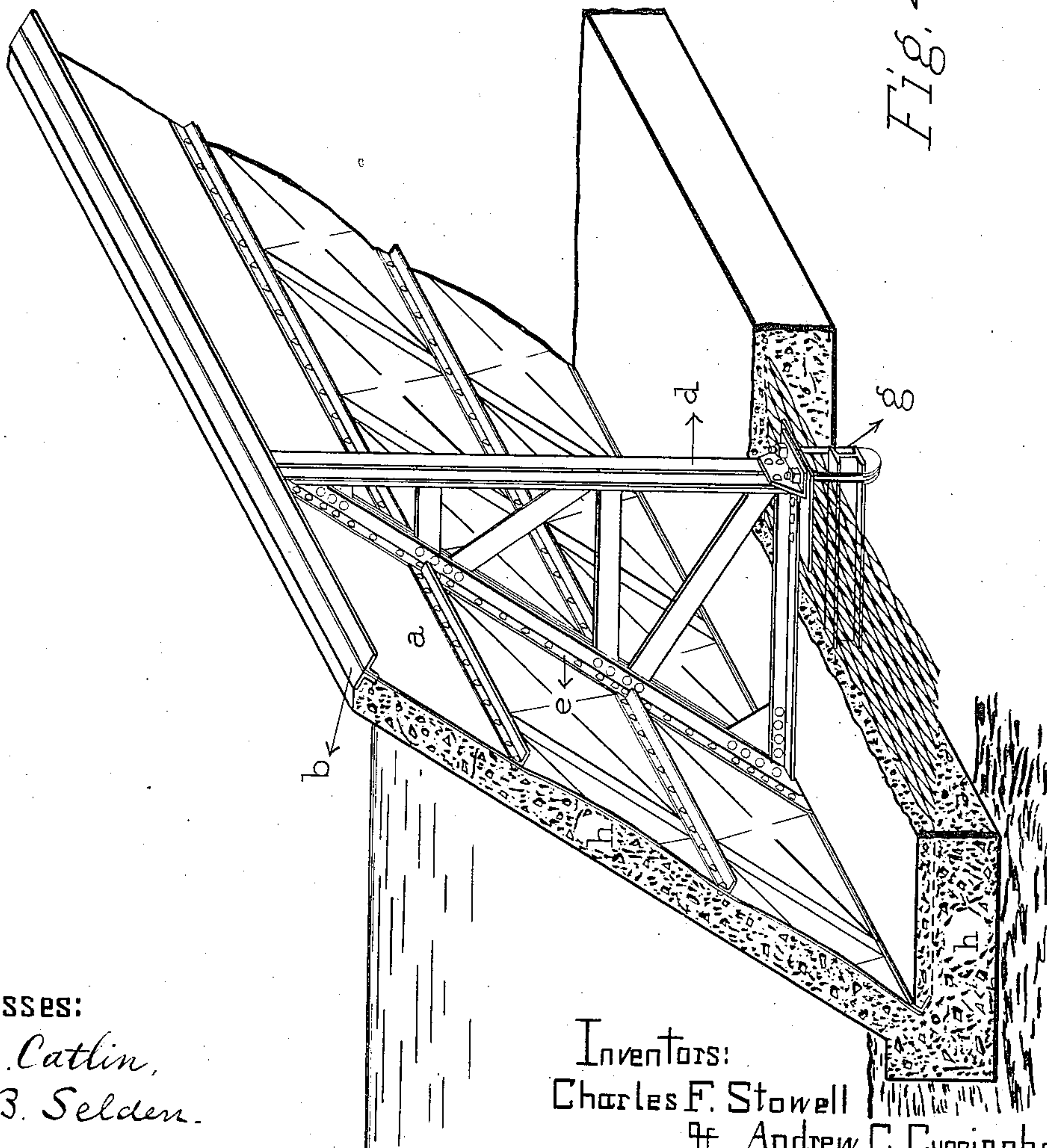
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4 Sheets—Sheet 4.



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UNITED STATES PATENT OFFICE.

CHARLES F. STOWELL AND ANDREW C. CUNNINGHAM, OF ALBANY,
NEW YORK.

WALL.

SPECIFICATION forming part of Letters Patent No. 629,477, dated July 25, 1899.

Application filed March 25, 1897. Serial No. 629,272. (No model.)

To all whom it may concern:

Be it known that we, CHARLES F. STOWELL and ANDREW C. CUNNINGHAM, residents of Albany, in the county of Albany and State of New York, have invented certain new and useful Improvements in Walls; and we 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 pertains to make and use the same.

The invention relates to walls for sustaining the pressure of earth, water, or other solids or liquids or of superimposed loads, or both, such as retaining-walls, dams, reservoir-walls, piers, abutments, dikes, levees, bulk-heads, tanks, revetments, and the like.

It has for its object to increase the stability and durability of such walls; and the invention consists in the construction hereinafter described and particularly pointed out.

In the accompanying drawings, Figure 1 is an isometric view, partly in section. Fig. 2 is a section on line 2 2 of Fig. 1. Fig. 3 is an isometric view, partly in section, of a modification. Fig. 4 is an isometric view, partly in section, of a modification of a different kind.

The improved wall is constructed of plates of iron, steel, or other suitable metal stiffened at the top, bottom, sides, and such intermediate points as may be necessary by angle-iron or other suitable stiffeners and braced at suitable intervals by knee-braces attached to the wall or face-plates, the whole being covered on one or both sides by a layer of cement, mortar, or concrete and resting on a concrete foundation, to which it is fastened by bolts or other suitable means at proper intervals. The weight of the mass of material superincumbent above the foundation keeps the latter in place and prevents overturning, while the foundation itself is stiffened and strengthened by embedding in it iron or steel in the form of beams, channels, or other suitable forms in order to prevent the foundation from breaking between the knee-braces.

In the drawings, *a* represents the metal face-plate, stiffened with angle-iron or like means along the edges, as shown at *b* and *c*. A knee-brace *d* is shown, riveted or otherwise secured to the face-plate, as indicated at *e*.

The knee-brace and face-plate may be bolted to foundation I-beams and channel-beams of metal, as indicated at *f* and *g* in the drawings. The improvement is, however, not limited to the particular form of these foundation-beams shown in the drawings nor to beam-stiffeners. The face-plate is backed by a suitable concrete or cement covering, and the braces and foundation-beams or other stiffeners are embedded in the same. Concrete is denoted by *h* and earth or other superposed material by *k*. The front face of the plate can also be covered with concrete, as indicated in Fig. 3, or the front face only of the plate can be so covered, leaving the rear face and braces exposed, as indicated in Fig. 4. Fig. 4 further illustrates a different form of knee-brace from that indicated in the other figures, the form and construction of the knee-braces not being essential. Fig. 4 also shows face-plates constructed of buckle-plates instead of flat plates, such construction being advantageous to certain cases, and it illustrates a modification of the method of stiffening and strengthening the foundations by the use of expanded metal instead of I-beams, as shown in the other figures. A portion of the concrete foundation in Fig. 4 is represented as being removed to show the plate of expanded metal embedded in the concrete.

It should be understood that by the term "concrete" we wish to include any equivalent, such as cement. Instead of or in combination with bolts any suitable means may be employed for fastening the parts together. Instead of foundation-bars such as illustrated angles, flat or round bars, plates, pipe, woven wire, wire-cloth, perforated or expanded metal, or other forms may be used, either flat or arched, or two or more of these forms of stiffeners may be combined. It is not essential that the stiffeners or stiffeners and braces be entirely covered with cement in all cases, particularly if some parts be accessible for painting, and it is optional whether or not the accessible parts of either the front or rear of the face-plate or of the braces be covered with concrete or the like. It is important that the face-plate and foundation be firmly connected, so that the latter shall resist a pressure tending to overturn the structure

and resist pressure due to a load, and that the foundation be stiffened to resist upheaval between the braces, and that all inaccessible parts be protected by a preservative covering.

5 The advantages of this form of construction over brick or stone masonry are less cost and greater facility of erection for a wall of equal strength and impermeability to liquids, such a wall being proof against leaks, while should
10 the wall be punctured by design or otherwise the hole is not liable to enlargement by erosion and can be easily repaired. The wall is absolutely safe against the attacks of water-rats or other burrowing animals, which often
15 cause the destruction of earth embankments. It is also free from liability to destruction in consequence of local defects, such as the disintegration of a stone or brick or locally-defective workmanship. It has greater ability
20 to sustain shocks or collisions than a brick or stone wall of equal strength and has less liability to failure in case of undermining of the foundations than a brick or stone wall, the improved wall being self-sustaining over
25 a much greater span.

In constructing our wall as specified we utilize the well-known property of concrete or cement mortar that it is one of the best-known preservatives of iron or steel against
30 rusting, and all portions of the wall which are not exposed to view are covered and protected by such preservative substance, while only portions that are readily accessible for covering with paint or similar preservative
35 coating are left exposed. We also take advantage of the further facts that the adhesion between iron or steel and concrete or mortar is very great and that their ratios of expansion and contraction by heat are substantially
40 alike, so that the bond between them is not broken by changes in temperature.

We are aware that metal beams, lath, and such like structures have been embedded in cement and this matter is not of our invention. Our improvement relates, primarily, to
45 structures exposed to the action of water, floating ice, or other objects and to the attack of animals and in which an opening, however small, when once formed is liable to
50 be speedily enlarged to the destruction of the entire structure or a very material part of it, and it comprises continuous plates, either integral or joined in sections, thereby presenting a continuous defense of practically
55 uniform character to blows or attacks and also providing against the enlargement by flowing water of an opening if one is formed, notwithstanding the continuous protecting-plate. It also comprises foundation-stiffening devices embedded in concrete continuous
60 with the concrete covering of the plates, whereby floating, undermining, and sinking are obviated.

It has been proposed to make walls and
65 floors of a continuous body of suitably-laid brick or stone and provide them with a sur-

face of concrete, brick, or stone, said walls having embedded metal ties, and it has also been proposed to make a jetty of a metal shell filled with concrete and joined to wooden
70 sills weighted with stone. Our improvement is characterized by a metal wall exteriorly protected in all inaccessible parts by concrete or the like, said concrete being continuous in the upright or approximately up-
75 right portion and in the foundation, whereby, as above set forth, the foundation-joint is strengthened and the metal is thoroughly protected against rust and whereby the continuation of the concrete in the foundation serves
80 as an anchor and also as a guard against undermining.

Having thus described our invention, what we claim, and desire to secure by Letters Patent of the United States, is—

85 1. In a wall for sustaining pressure on a face thereof, a metal plate coextensive with the exposed face of the wall, a metal foundation, and a continuous covering of concrete or the like for all inaccessible portions of the
90 plate and foundation, both parts of the concrete being joined at the foundation to prevent undermining or overturning, and to strengthen the joint, substantially as described.

95 2. In a wall for sustaining pressure, a metal face-plate, a covering of concrete or the like, and foundation-stiffening devices embedded in concrete, the concrete covering the plates and foundation being continuous and said
100 stiffening devices and face-plate fixed together, substantially as described.

105 3. In a wall for sustaining pressure, a metal face-plate, a covering of concrete or the like, and foundation-stiffening devices embedded in the concrete, said face-plates and foundation-stiffeners being secured together by
110 braces and all inaccessible portions of the metal being covered with a continuous body of concrete, substantially as described.

115 4. In a wall for sustaining pressure, metal face-plates, a covering of concrete or the like, and foundation-stiffening devices embedded in the concrete, and braces also embedded in concrete and secured to the face-plate and to
the stiffeners, substantially as described.

120 5. In a wall for sustaining pressure, metal face-plates, a covering of concrete or the like, and foundation-stiffening devices embedded in the concrete, said face-plates and foundation-stiffeners being secured together by
braces and the braces, stiffeners and the back of the plates covered with a continuous body of concrete, substantially as described.

In testimony whereof we have signed this
125 specification in the presence of two subscribing witnesses.

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Witnesses:

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