No. 639,961. Patented Dec. 26, 1899.

A. DE MAN.

JOINT FOR STRUCTURAL BUILDING MEMBERS.

(Application filed Aug. 28, 1899.)

(No Model.)

Fig. 3

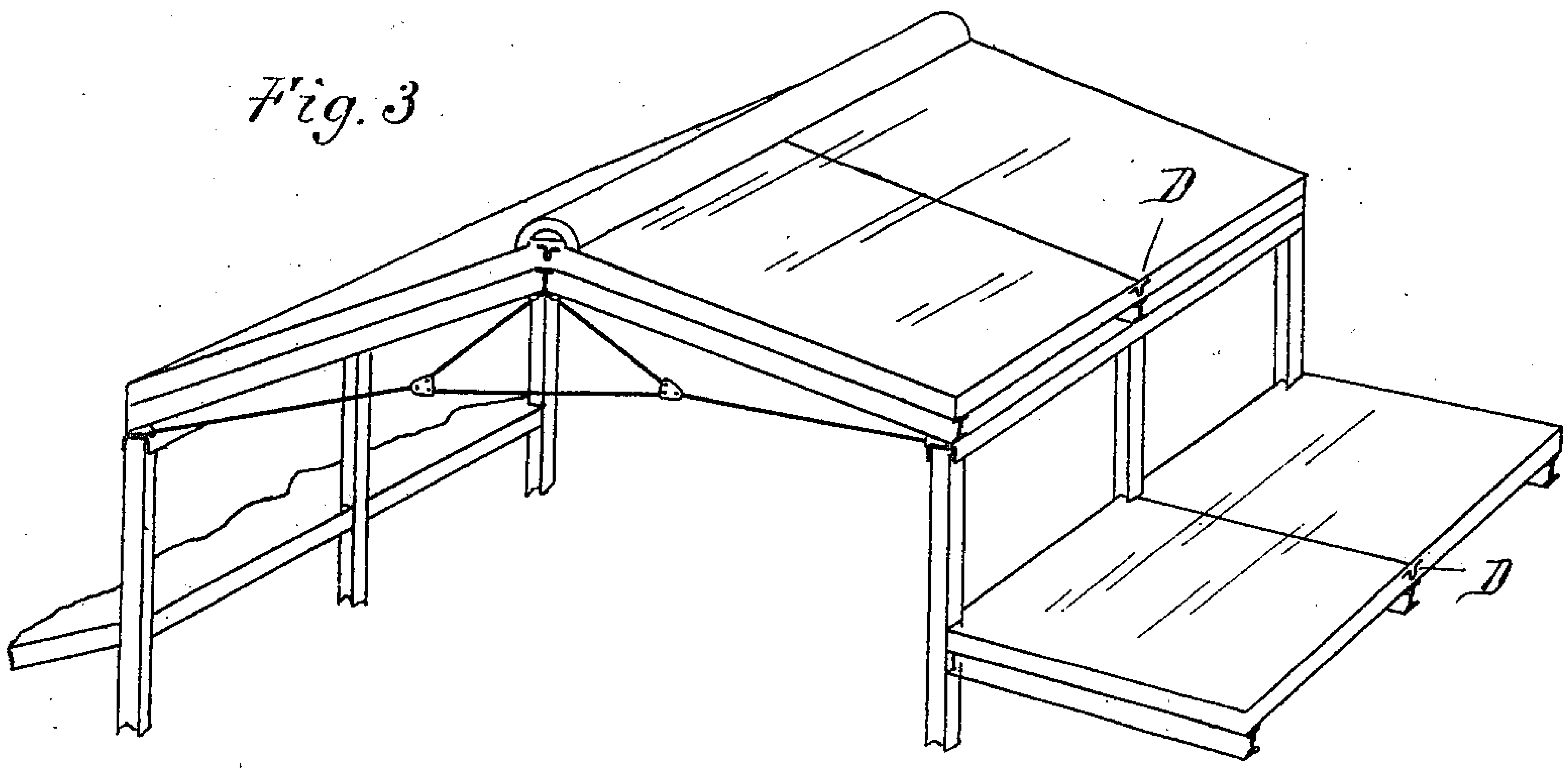


Fig. 1

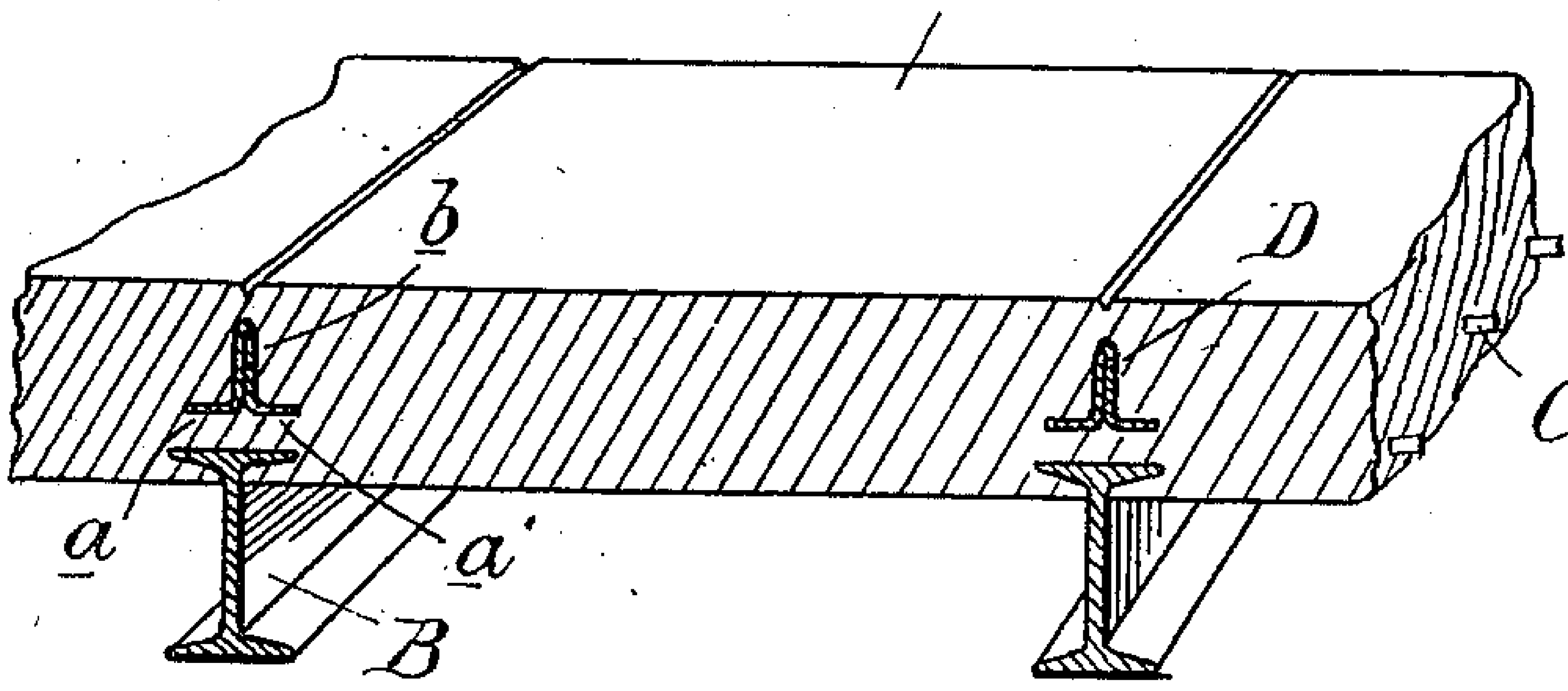


Fig. 6

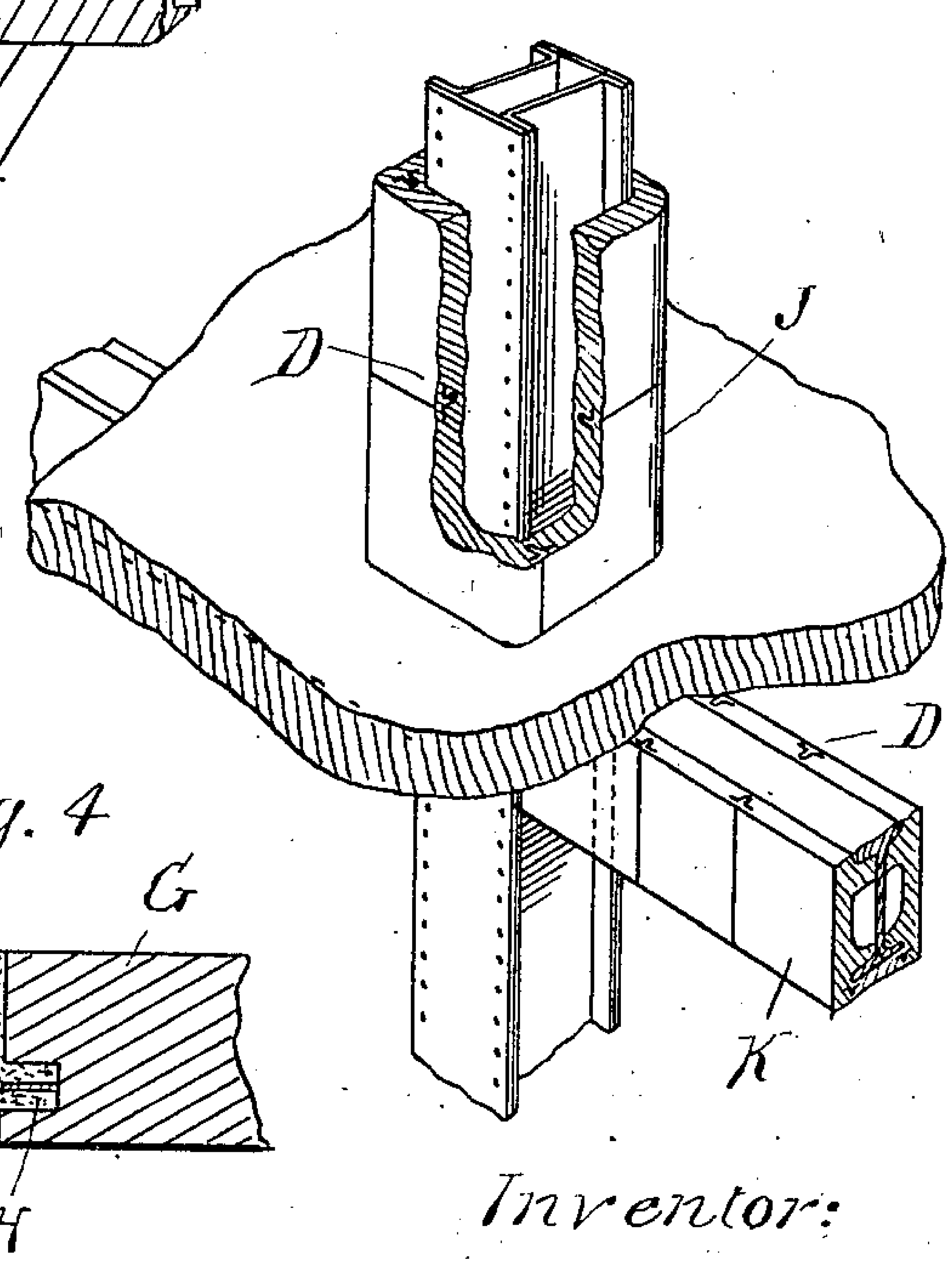


Fig. 2

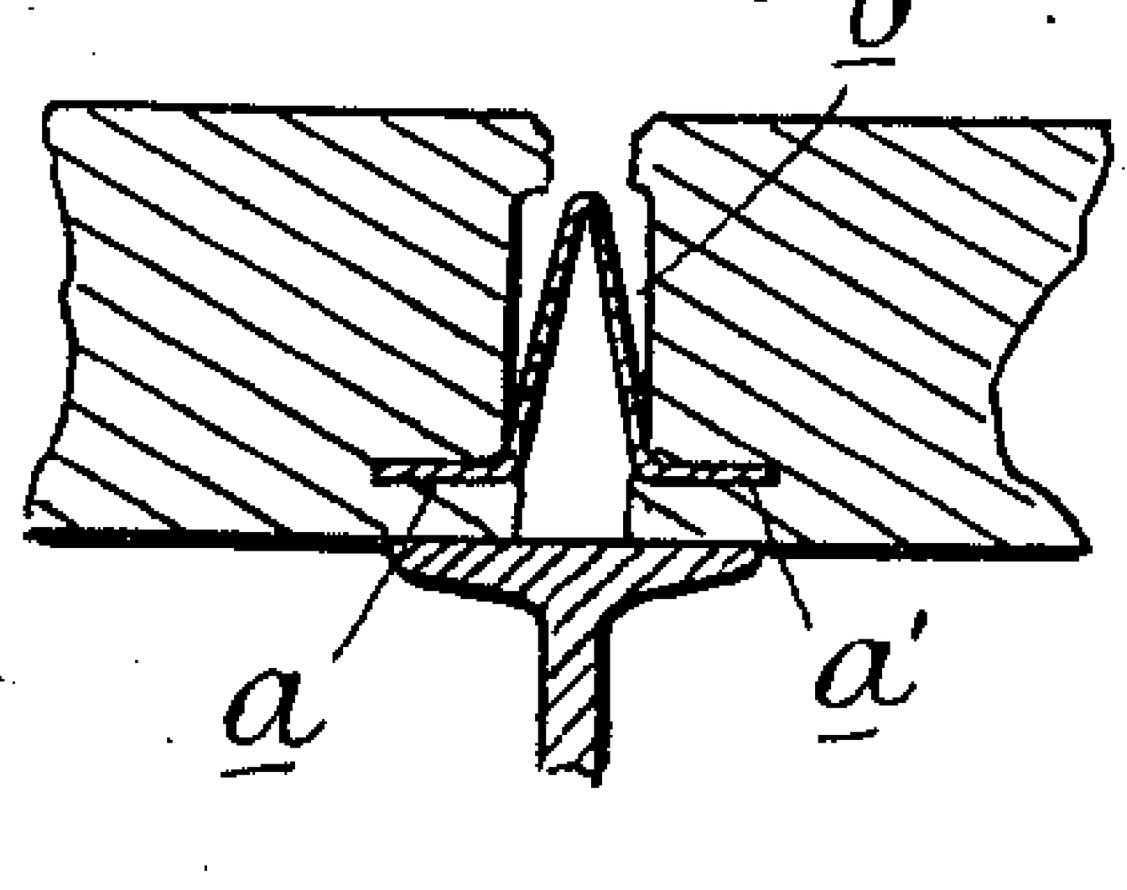
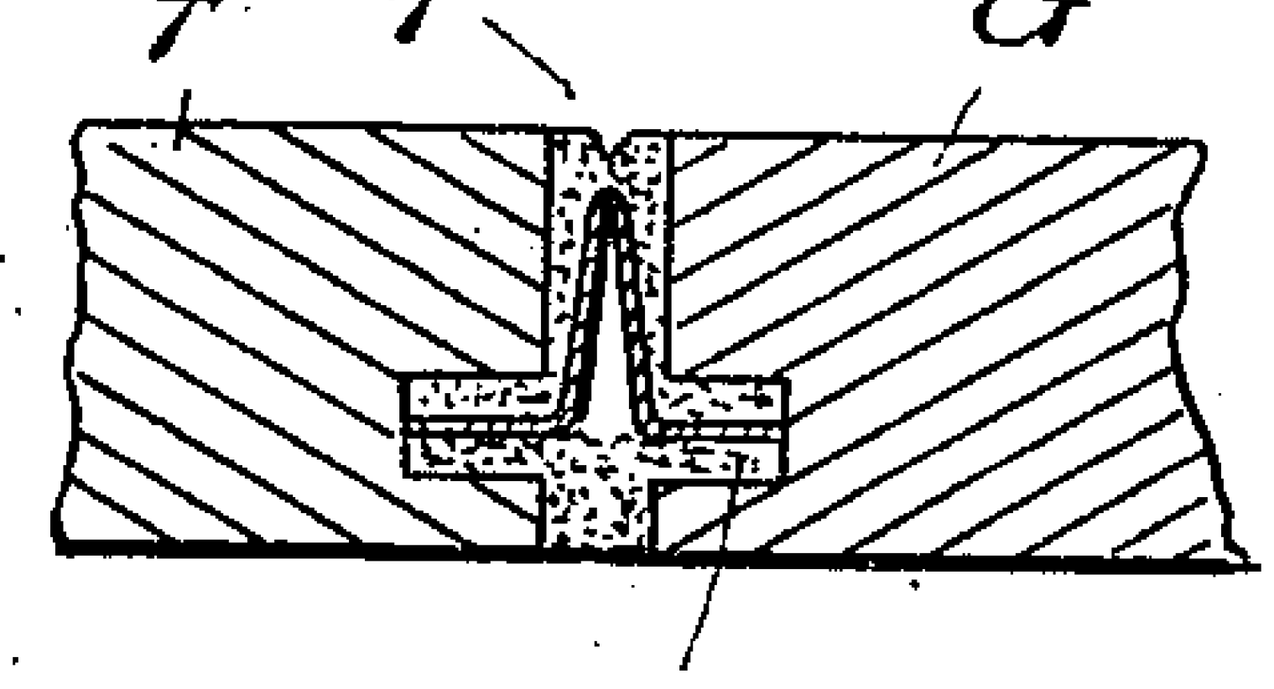


Fig. 5

Fig. 4



Witnesses:
H. C. Smith.
M. B. O'Dogherty.

Inventor:
Alphonse De Man
By Thos. S. Sprague & Son. Attys.

UNITED STATES PATENT OFFICE.

ALPHONSE DE MAN, OF DETROIT, MICHIGAN.

JOINT FOR STRUCTURAL BUILDING MEMBERS.

SPECIFICATION forming part of Letters Patent No. 639,961, dated December 26, 1899.

Application filed August 28, 1899. Serial No. 728,753. (No model.)

To all whom it may concern:

Be it known that I, ALPHONSE DE MAN, a citizen of the United States, residing at Detroit, in the county of Wayne and State of Michigan, have invented certain new and useful Improvements in Joints for Structural Building Members, of which the following is a specification, reference being had therein to the accompanying drawings.

My invention relates to connecting-joints between the building material of certain classes of constructions in which artificial stone, tile, or even slabs of natural stone are employed and in which it is desired that the joint should be both flexible and water-tight.

It is the object of the invention to provide means for compensating for the expansion and contraction of the mass due to changes in temperature or other causes; and to this end the invention consists in the peculiar construction and arrangement of a flexible joint or connecting member between separable sections of the mass. The same device also makes up for slight deviations between adjoining sections resulting from uneven settling of the structure, the joint accommodating itself to the deviation and at the same time remains a sealed joint, as more fully hereinafter described and claimed.

My improvement is especially applicable to monolithic structures—such as floors, roofs, &c.—which are formed by filling in a suitable skeleton framework with artificial stone or other like cementitious material while in a plastic state. As heretofore made such structures are open to the objection that changes in temperature will cause expansions or contractions, which by reason of the extent of the mass is sufficient to cause a considerable movement at the extremities. This will produce either irregular cracks in the mass in case of contraction or in case of expansion a displacement of the walls or supports. Thus for roofs, especially where subject to the varying temperatures of day and night, summer and winter, and where the necessity exists for at all times maintaining a water-tight covering, such monolithic structures have proven unsatisfactory. With my construction this difficulty is overcome by dividing the mass into a series of separable sections united to each other by extensible connections or bridges, which preserve the continuity and waterproof character of the structure as a whole, while permitting of an independent movement of the sections.

Another application of my invention is a connection for the several sections of the protecting-covering for the metallic members in fireproof building constructions. In such structures the metallic beams, girders, and columns are protected either by being embedded in a monolithic mass or they are incased by a protecting-covering formed of slabs of artificial stone, tile, or other material. In either case the necessity exists for maintaining the continuity of the covering and at the same time providing for expansion and contraction. With my improvement this may be accomplished, as will be more fully hereinafter explained.

A third application of my invention is in structures where there is a necessity of providing for a slight lateral deflection or deviation from the same plane of the sections composing the structure and where it is desirable to maintain a sealed joint between said sections.

In the drawings, Figure 1 is a sectional perspective view of a monolithic structure in which my improvement is employed. Fig. 2 is a section showing the effect of contraction. Fig. 3 is a perspective view of a monolithic roof provided with my expansion-joint. Fig. 4 is a section illustrating two slabs of natural stone connected by my contraction-joint. Fig. 5 is a section showing an arrangement especially designed to take care of both the expansion and contraction. Fig. 6 is a sectional perspective view illustrating the structural members of a building having protecting-casings provided with my elastic joint.

Referring to the construction shown in Figs. 1 and 2, A is a portion of a monolithic floor or roof span resting on suitable supports, such as the beams B. This structure may be formed of concrete or any like cementitious plastic material and may, if desired, be strengthened by metallic members embedded therein, such as indicated at C. In the formation of the span before the plastic material is laid the space is divided into a number of sections along the dividing-lines of which are laid the extensible members D forming the

expansion-joint. The form which I preferably employ and which I have illustrated in the drawings consists of a T-shaped member D, formed of sheet metal, having a single-ply flange *a a'* and double-ply web *b*. These members are placed in position so that when the plastic body is filled in the web of the member will extend transversely of said body along the dividing-lines between the sections, and the flanges will form anchors into said sections on both sides of the dividing-line. The embedding of these two-ply members in the body material will form a weakened line therein, which in case of any subsequent contraction will cause the material to sever along said line, as shown in Fig. 2, and as the flanges of the member are firmly anchored in the adjacent sections said member will form a connecting-bridge, preserving the continuity and waterproof character of the span.

A span constructed as above described will take care of contraction, and thus when laid in hot weather it will compensate for any changes due to the subsequent cooling of the mass. Where, however, provision needs to be made for expansion also, I preferably employ the construction shown in Fig. 5. In this the sections of the span when laid are separated from each other, which may be accomplished either by forming a dividing-rib in the false work on which the body material is laid or by filling in the cementitious material in solid mass and then cutting out a portion before it has hardened. In this construction, as in the one previously described, the member D is laid between the sections, with its flanges anchored thereon; but before it is so laid the two plies of the web are spread apart, as shown. After the body material has hardened the space between the sections is preferably filled with some elastic packing material E, such as oakum and asphalt. It will be understood that such a construction provides for expansion as well as contraction and that the elastic material will take up any elongation of the sections.

In Fig. 4 I show a construction in which slabs F and G, of natural stone or other "building material," (by which term I mean to include stone, tile, artificial stone, and like materials,) are united by my flexible joint. In this the separate slabs are first grooved or channeled at H along their edges to receive the flanges of the T member and are then placed in position with the member between, as shown, after which a cement or asphalt filling I is run in the crevice to anchor the flanges and to make a tight joint.

In Fig. 3 I show a roof formed in several sections united by my flexible joint.

Fig. 6 illustrates a column having a protecting fireproof casing J, formed in sections united by elastic joints, and also shows a protecting-casing for a beam similarly made.

With these constructions the metallic structural member will be effectually protected both from the heat in case of fire and also from water. This latter is desirable, for the reason that if water were to pass through the casing it might generate sufficient steam to cause the breaking down of the whole covering. Moreover, it is desirable to keep the water from contacting with said structural metallic member while the latter is in a heated state.

In all of these various constructions the extensible member permits of independent movement of the sections, while it serves to unite said sections to each other, and is itself protected by being located between the adjacent ends of the sections.

What I claim as my invention is—

1. A structure comprising separable sections of building material and an extensible member embedded in said sections and bridging the division-line therebetween throughout its entire length.

2. A monolithic construction having a weakened line therein dividing the structure into separable sections, and an extensible member embedded in said structure bridging said weakened line.

3. In a structure, the combination with separable sections of the building material of an extensible joint between said sections comprising a member having a longitudinal fold or return-bend said member being arranged along the division-line between said sections throughout its entire length and the two sides of said members being respectively anchored to said sections.

4. In a fireproof structure, the combination with a slab composed of separable sections of the fireproof material, of a flexible joint between said sections comprising a T member having single-ply flanges and double-ply web, said member being arranged with its web extending transversely of the slab and along the division-line between the sections and having its flanges respectively embedded in said sections.

5. A structure comprising separable sections of building material and an extensible connecting member forming a sealed joint between said sections.

6. A structure comprising separable sections of building material and an extensible connecting member bridging the division-line therebetween throughout its entire length permitting of expansion, contraction or lateral deflection, of said members.

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

ALPHONSE DE MAN.

Witnesses:
JAMES WHITTEMORE,
H. C. SMITH.