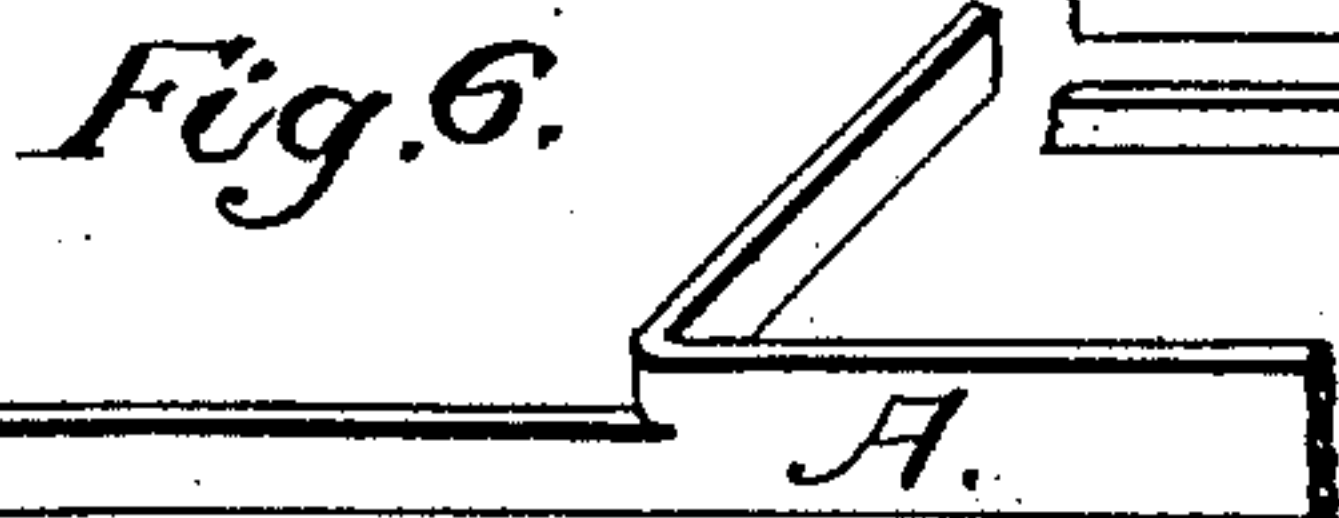
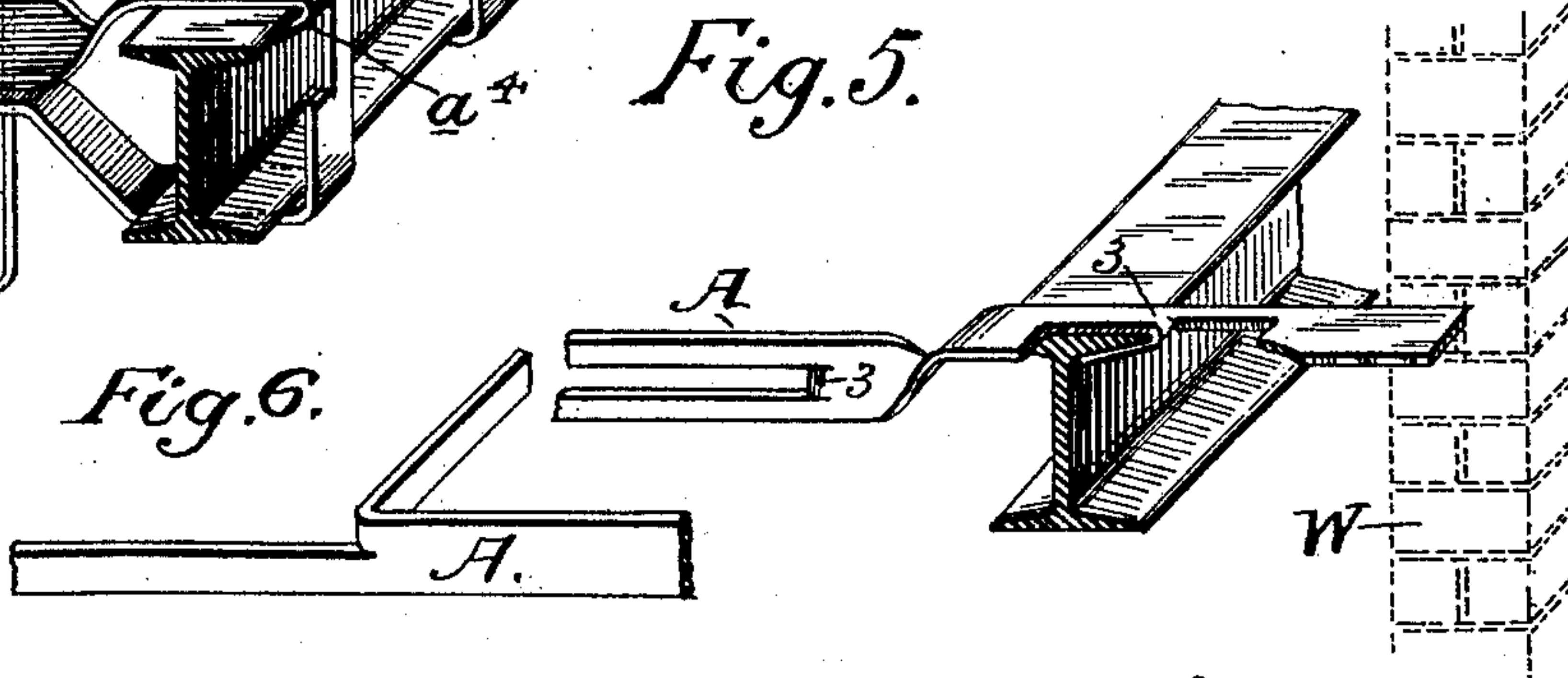
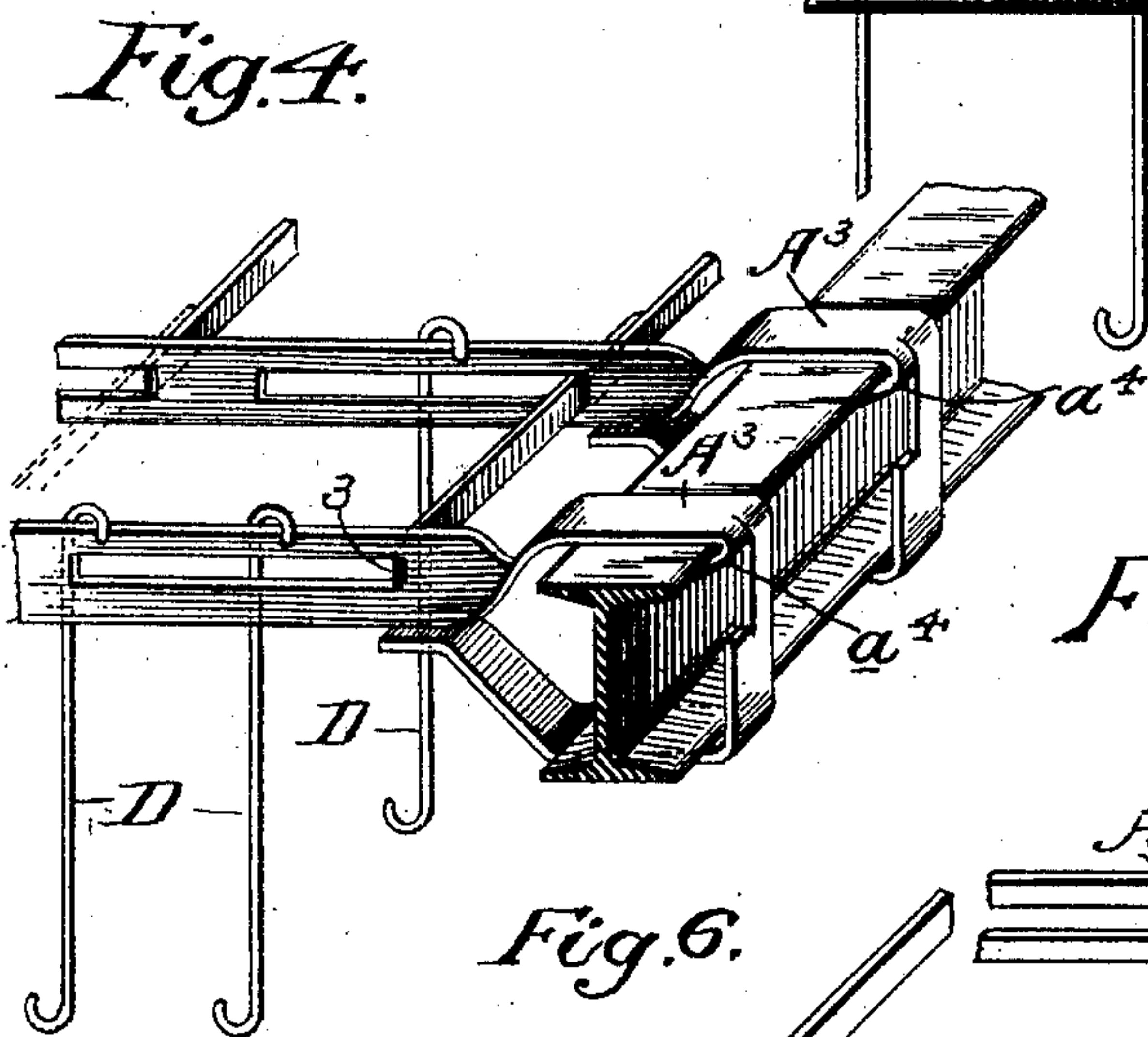
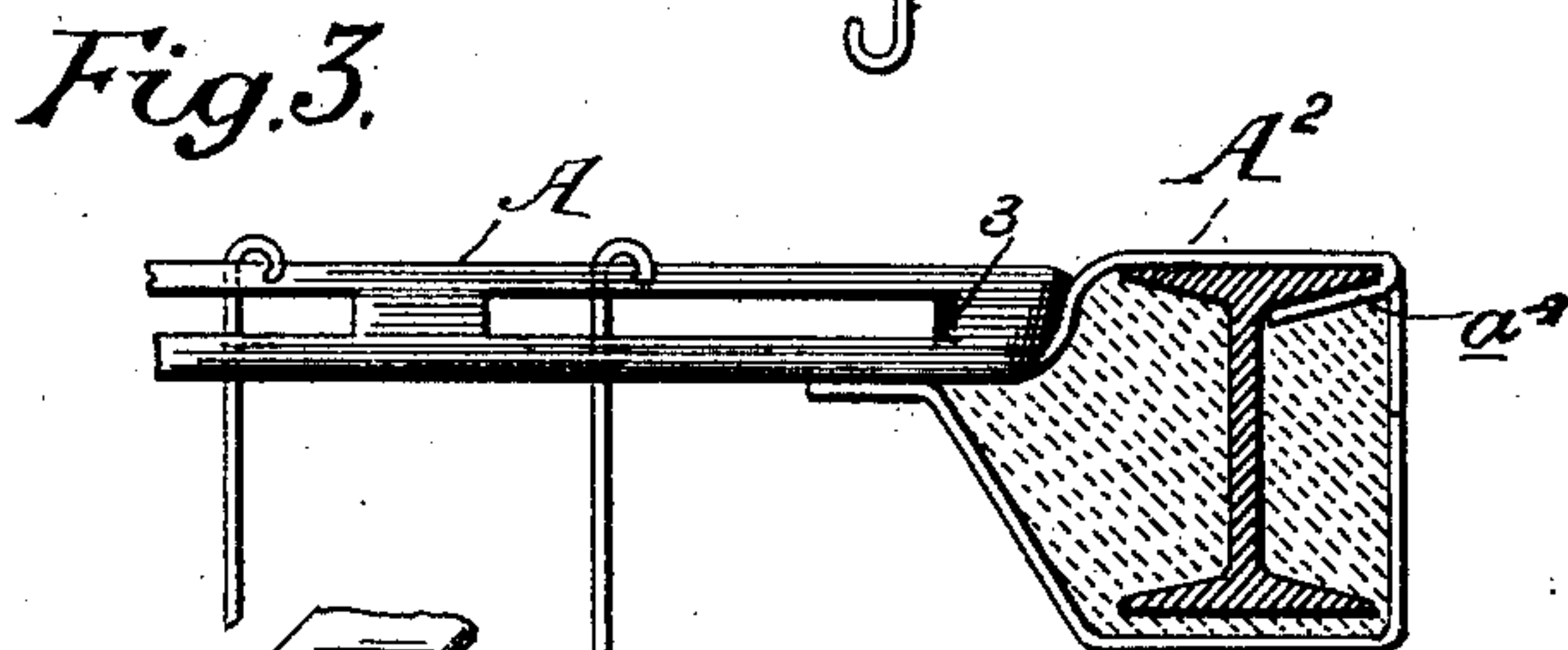
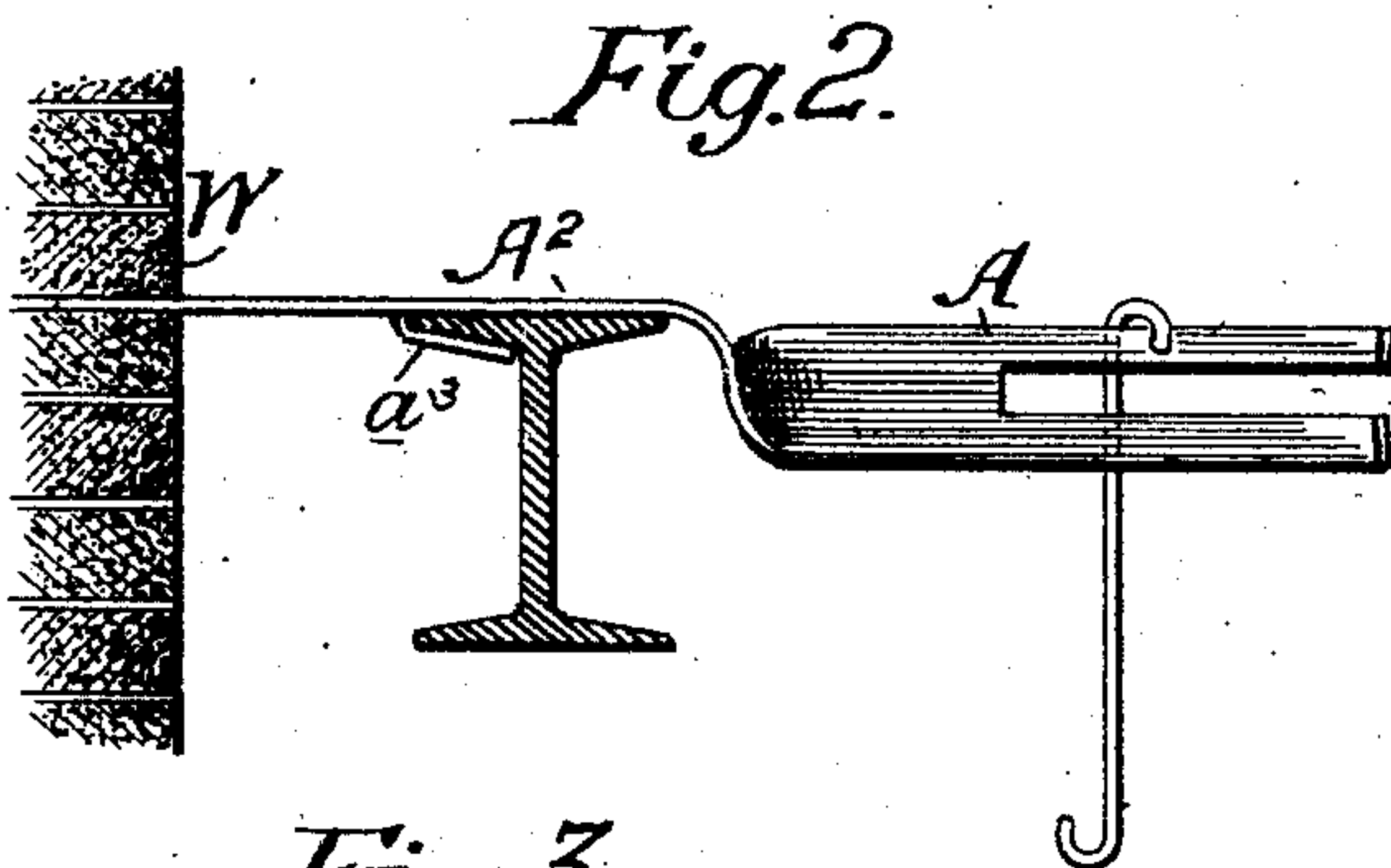
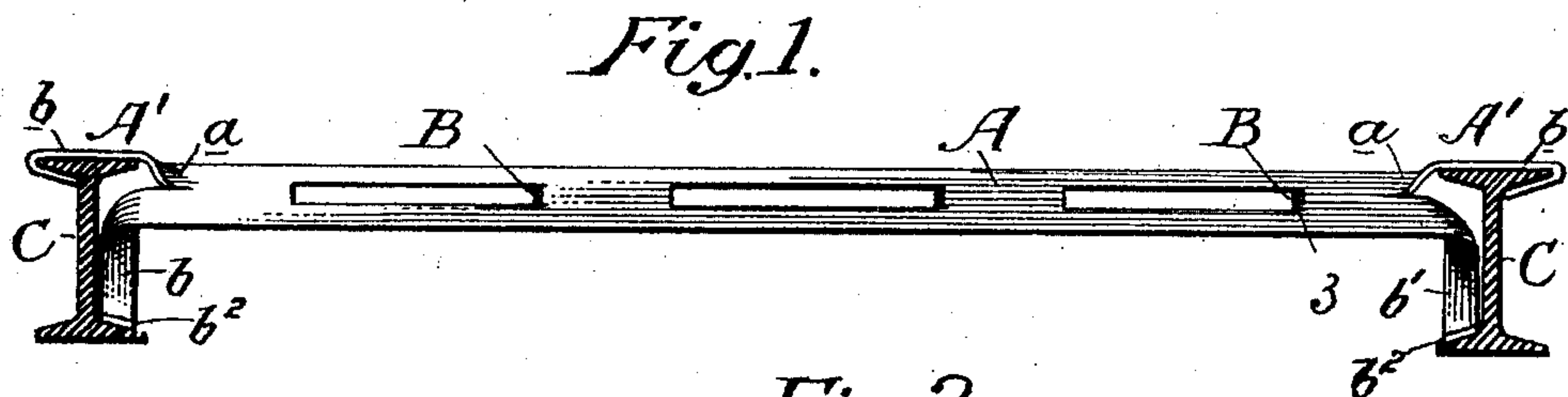


No. 830,494.

PATENTED SEPT. 11, 1906.

C. COLLINS.  
BUILDING CONSTRUCTION.  
APPLICATION FILED MAR. 2, 1904.



Witnesses:  
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# UNITED STATES PATENT OFFICE.

CORNELIUS COLLINS, OF SAN FRANCISCO, CALIFORNIA.

## BUILDING CONSTRUCTION.

No. 830,494.

Specification of Letters Patent.

Patented Sept. 11, 1906.

Application filed March 2, 1904. Serial No. 196,234.

*To all whom it may concern:*

Be it known that I, CORNELIUS COLLINS, a citizen of the United States, residing in the city and county of San Francisco, State of California, have invented certain new and useful Improvements in Fireproof Building Construction, of which the following is a full and clear description, reference being had to the accompanying drawings, forming part of this specification, and in which similar characters of reference indicate like parts throughout the several views.

My invention relates to certain new and useful improvements in fireproof building construction where structural metal is used and where parallel strips of sheet metal having little inherent rigidity in themselves are so connected with each other and with supporting-beams by lateral or transverse braces as to form rigid structures capable of supporting mortar, concrete, or other plastic material which will harden after application, whereby the metal and concrete become mutually supporting and are especially useful in the construction of ceilings and floors which it is desired to render fireproof and where it is desirable to protect the metal from the direct action of heat or from destruction by oxidation or other cause.

My present invention consists of the parts and the constructions and combinations of parts which I will hereinafter describe and claim.

Figure 1 represents a cross-sectional view of two I-beams and an intermediate strip, showing the ends of the strip split longitudinally, with one of the split portions given a partial twist and extended over the flange of the I-beam and bent thereunder and the other split portion partially twisted and extended substantially parallel with the web of the beam to form a haunch. Fig. 2 is a view similar to Fig. 1, showing the strip with a quarter-twist proximate to the beam and thence carried over the beam and extended to and between the courses of a wall, said extended portion being slitted transversely and longitudinally to form a bendable tongue, which is turned under the flange of the beam to lock therewith. Fig. 3 is a view similar to Fig. 2, but showing the extended end part of the strip bent parallel with the web of the beam and thence bent under the lower flange thereof and returned to a point of engagement with the part of the strip. Fig. 4 is an

enlarged perspective view of the end portions of the strips of Fig. 3 and one of the beams. Fig. 5 is a modified perspective view of Fig. 2. Fig. 6 is a perspective view of a modification.

In modern methods of building it is the tendency to eliminate wood and combustible material to as great an extent as possible and to substitute in lieu thereof wherever practicable steel, brick, stone, concrete, and other non-combustible materials. It is also desirable on account of the costly character of such structures to economize the interior space as much as possible by making the interior wall, ceilings, and floors as thin as is consistent with strength and sufficient solidity to maintain them in place without vibration and to make them fireproof and resistant.

The essential object of my invention is to still further economize in the cost of such structures by using thin sheet metal cut into strips which of themselves have little or no rigidity or tensile strength in the direction of the thickness of the metal, and preferably by a series of slots and tongues or connecting braces or ribs these said strips being set up into structures of the forms required in building, and by their union with each other and with adjacent parts a sufficient stiffness is given to them in the direction of the thickness of the metal, while transversely or from edge to edge they stand in the direction of such strains as are liable to come upon them and by their union are rendered as rigid in this direction as the heavier angle or other iron ordinarily used. In conjunction with these metallic structures I employ mortar, concrete, or other plastic material which will afterward harden, and this is spread over and through the structure, the slots of which enable it to unite and form a continuous bond, whereby the hardened material and the metal form mutual supports for each other, while the metal being covered by and embedded in the material is protected from the action of heat in case of conflagration and is made almost absolutely fireproof.

The metal which I employ may be of suitable or desired thickness; but, as previously stated, for the sake of cheapness in construction I prefer to use sheet metal which is too thin to support itself in single pieces or strips unaided. These strips A, I have herein shown as being very similar to the same



strips of my former patent, No. 640,445, dated January 2, 1900, to the extent that they are longitudinally slitted at desired points to form the tongues B and which  
 5 tongues may be struck out from the central portions of the strip or from the edge thereof, as in Fig. 6, as fully disclosed in said former patent. In the present case, Figs. 1, 2, 3, 4,  
 10 and 5, I show the tongues struck out from the central portions of the strips, and for the sake of economy I show the tongues separated from the strips in such manner that one end of the tongue remains attached to the main strip, as at 3, said tongue of one  
 15 strip being carried across the space between said strip and an adjacent like one and being locked or attached to the other by any of the methods employed for connecting two pieces of metal to form a rigid brace therebetween.  
 20 The strips A made as herein described have sufficient stiffness edgewise for the purposes for which they are used, and the tongues or connecting-braces, which are preferably but not necessarily cut from them,  
 25 do not materially weaken the structure, at the same time providing all that is necessary for such braces without additional metal, and when used in conjunction with the plastic material the strength and rigidity be-  
 30 come sufficient for all purposes for which it can be used. In conjunction with the strips I employ any form of metallic lathing or support for concrete or like plastic material, in which the strips may be embedded, and said  
 35 strips thus form a support for the material and enable it to be put on at once without the necessity of using removable centers.

In Fig. 1 I show the strips extending transversely from one I-beam C to another, said  
 40 strips being laid on edge and being given a twist at  $a$  adjacent to each beam, whereby one or both of the end portions  $A'$  of the strips may be laid flat upon the flanges of the beams. The end portions  $A'$  of the strips  
 45 are split longitudinally, and one of the split members  $b$  is carried over the flange of the beam and has its end or terminal bent under said flange, while the other split portion or member  $b'$  is given, say, a half-twist and bent  
 50 downwardly parallel with the inner side of the flange of the beam and has its lower end adapted to seat upon the top of the lower flange of the beam, said member  $b'$  thus forming a haunch or the arch of the strips. The  
 55 lower ends of the members  $b'$  may be bent at right angles, as shown at  $b^2$ , to form a shoe or foot, which may be supported on or secured to the flange of the beam by any well-known method in use for this class of work.

60 In Fig. 2 the construction is somewhat modified. For instance, in said figure the end portion  $A^2$  of the strip is split at an intermediate point from one edge to form a tongue  $a^3$ , which is bent under the flange of the beam,  
 65 the remaining portion being extended be-

yond the beam and being fixed between the courses of a brick or stone wall W.

In Figs. 3 and 4 is a further modification, wherein the end portion  $A^3$  of the strip is split at the side at an intermediate point to  
 70 form the tongue  $a^4$ , which is bent under the top flange of the beam, said portion  $A^3$  thence extending entirely around the beam and being returned to the main part of the strip and fastened thereto by any suitable  
 75 means. The end portion of the strip which thus passes around the beam may be out of contact with the lower flange thereof, and thereby leave a space which may be filled with concrete or similar plastic material, so  
 80 that the beam will be entirely embedded in the concrete and be protected from the direct action of fire. The formation of the tongues and the bending of these parts around the flange of the beam not only forms a secure  
 85 lock, but in the bending operation all slack in the thin strip A is taken up and said strip is drawn tight and under proper tension. If desired, the ceilings below the strips may be supported from the horizontally-disposed  
 90 strips by means of hooks D, (shown in Fig. 4,) the shanks of said hooks depending from the strips and having their lower ends upturned or otherwise formed to engage with  
 95 and sustain the ceiling directly from the strips, it being understood that the said hooks are suspended directly from the strips and from the bent-out tongues or braces thereof, if desired, at such points as may be necessary and which experience shows best  
 100 adapted for the purpose in view.

The structure which I have invented utilizes every available unit of tensile strength in the sheet-iron or other sheet material of which my bond is composed, as all the strips  
 105 of such material are placed with their width in the line of the strains to which the whole fabric is subjected, thereby saving the entire practical tensile strength of such bond material.  
 110

The tongues throughout their length are of uniform width, so that the structure has imparted to it by means of the adhesion of the plastic material the entire strength of the  
 115 tongues, and the material taken from the strips and used for tongues or braces can be so used without sacrificing the tensile strength of the completed structure, and by utilizing such material for the tongues or braces economy in material and lightness in weight  
 120 are gained. When the plastic material is set, I have then a continuous fireproof floor construction of great rigidity and tensile strength forming a slab with a projecting beam or girder on two or all of its sides and a floor  
 125 which for lightness, rigidity, and tensile strength is fully equal, if it does not surpass, the former constructions employed for a like purpose.

Having thus described my invention, what 130



I claim as new, and desire to secure by Letters Patent, is—

1. The combination with beams or like fixed portions of structures, of strips of metal in substantially parallel rows extending between and across the beams, and having slots made through them, and uniting-tongues, said strips connecting with the beams and having their ends fixed in the walls and uniting said walls to the interior steel structure.

2. The combination with beams and like portions of structures, of strips of metal in substantially parallel rows extending between and across the beams, and having slots made through them, and uniting-tongues, and hangers suspended from the strips and adapted to engage and suspend the ceiling below.

3. The combination with flanged beams and like portions of structures, of strips of metal in substantially parallel rows extending between the beams, said strips being twisted proximate to the beams and having a portion carried over the beam and provided with a tongue which is bent under the flange of the beam to lock the strip to the beam.

4. The combination with flanged beams

and like portions of structures, of strips of metal in substantially parallel rows extending between the beams, said strips being bent proximate to the beams and each having one portion carried over the beam and provided with a tongue which is bent under the flange of the beam and locked thereto, and another portion extended beyond the said tongue portion.

5. The combination with flanged beams and like portions of structures, of strips of metal in substantially parallel rows extending between the beams, said strips each having split portions one member of which is bent over the flange of the beam to form a locking-tongue and another portion is extended beyond said tongue and substantially parallel with the web of the rail, and having its end secured, and hangers suspended from the strips and adapted to engage and suspend the ceiling below.

In witness whereof I have hereunto set my hand.

CORNELIUS COLLINS.

Witnesses:

HENRY P. TRICOU,  
S. H. NOURSE.