J. C. PELTON.

BUILDING CONSTRUCTION.

APPLICATION FILED JAN. 8, 1906.

930,610.

Patented Aug. 10, 1909.

3 SHEETS—SHEET 1.

Fig. 1ª

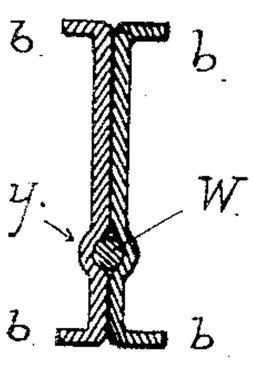

Fig. 1.

Witnesses:

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Florence E. Osborne.

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3 SHEETS—SHEET 2.

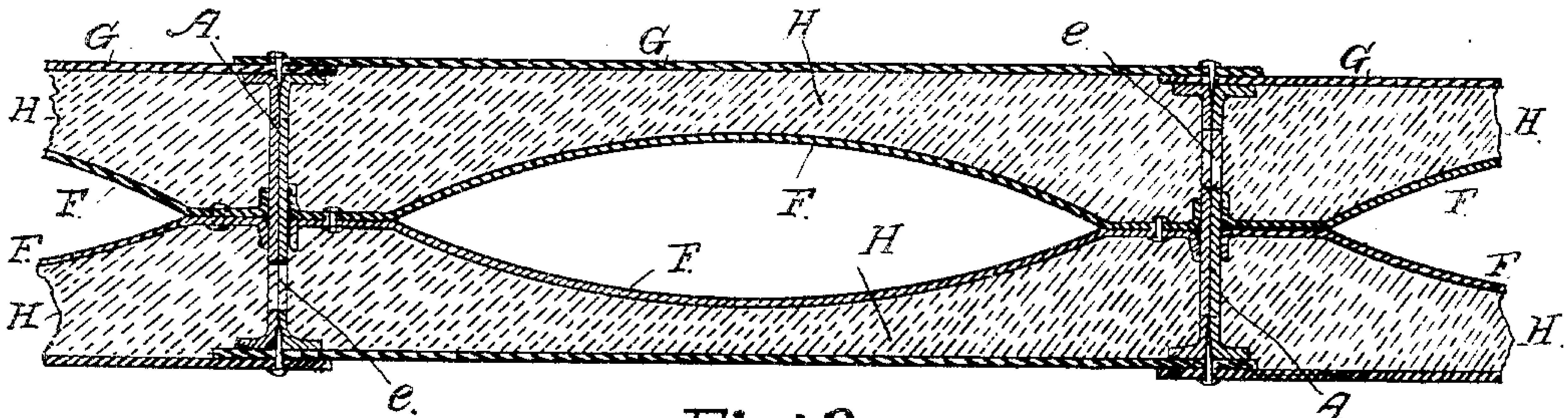
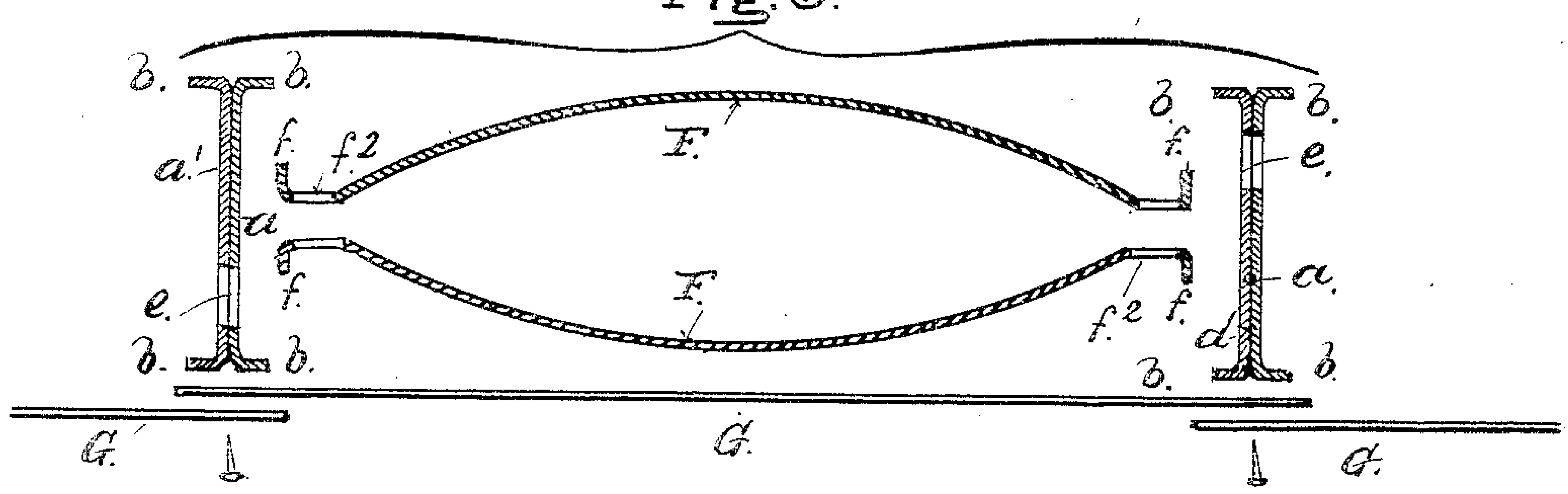


Fig: 2.

Fig: 3.



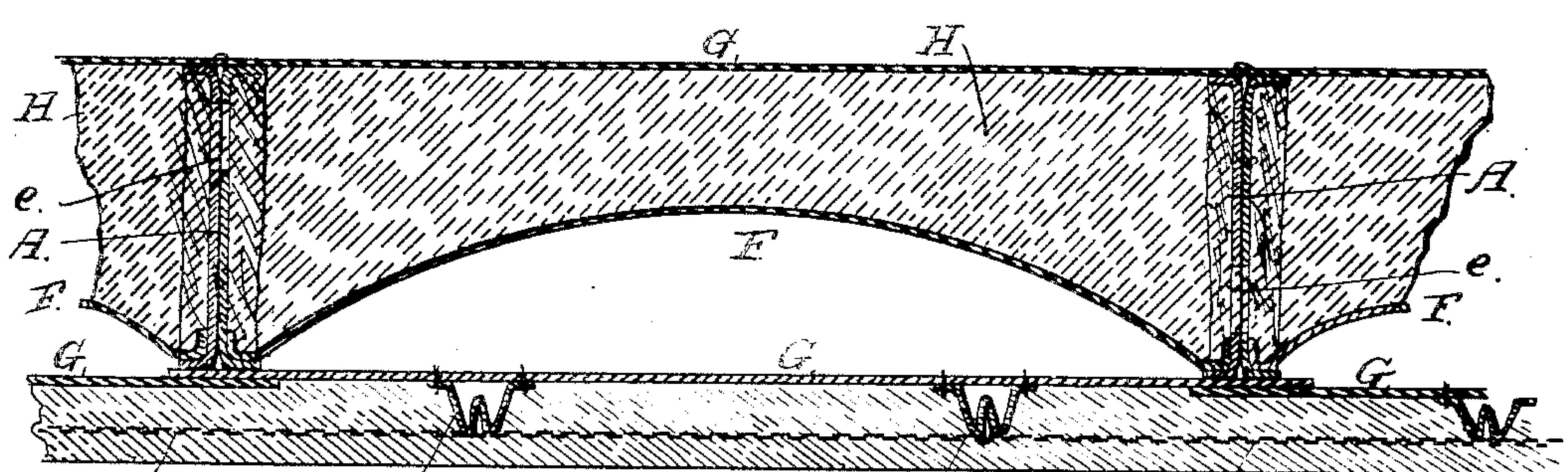


Fig: 4.

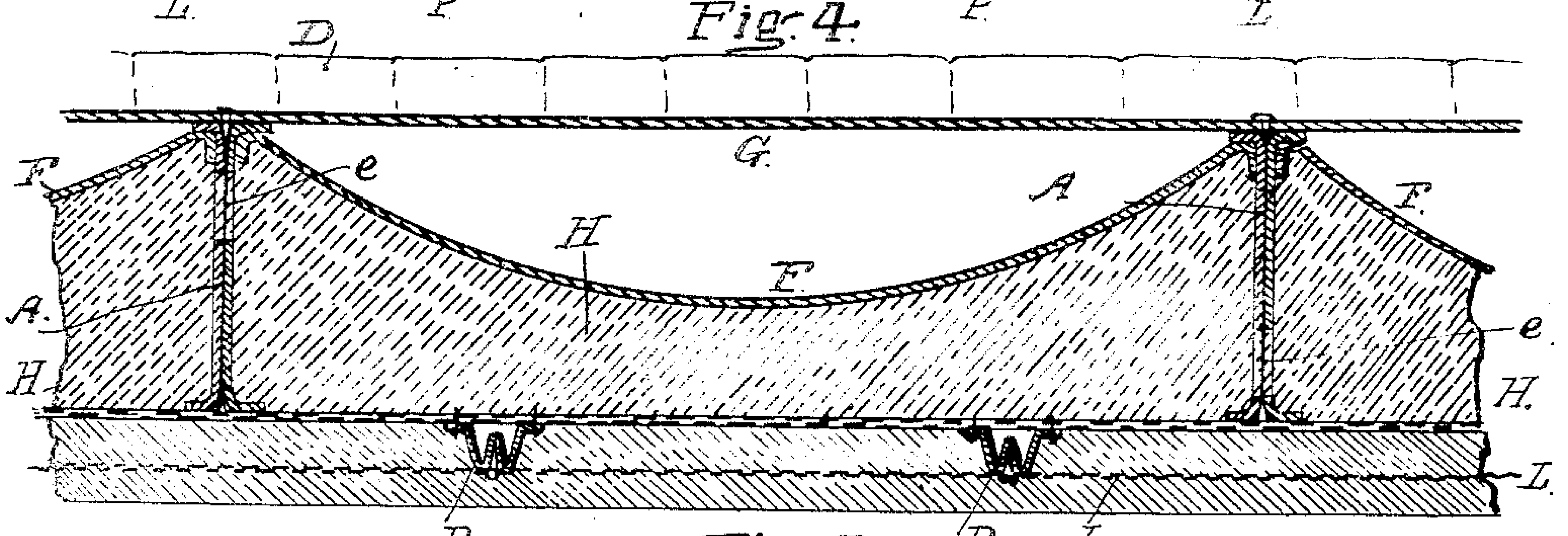


Fig. 5.

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3 SHEETS—SHEET 3.

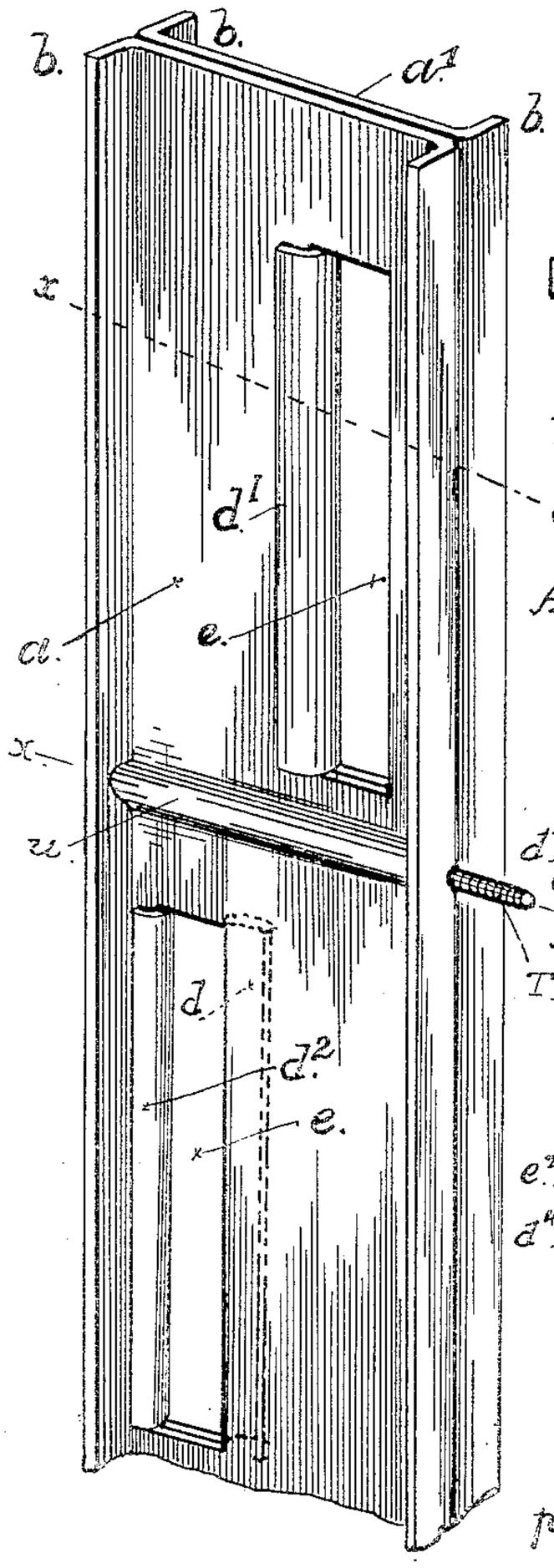

Fig. 6.

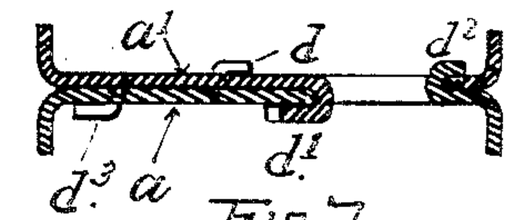

Fig. 7.

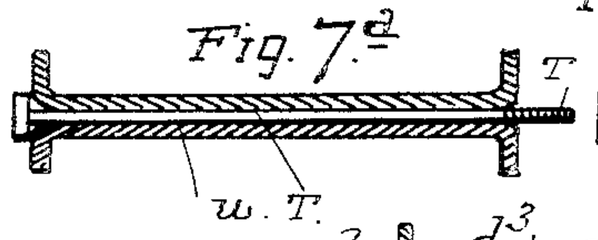

Fig. 7a.

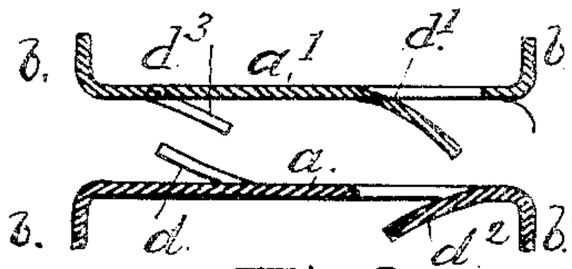

Fig. 8.

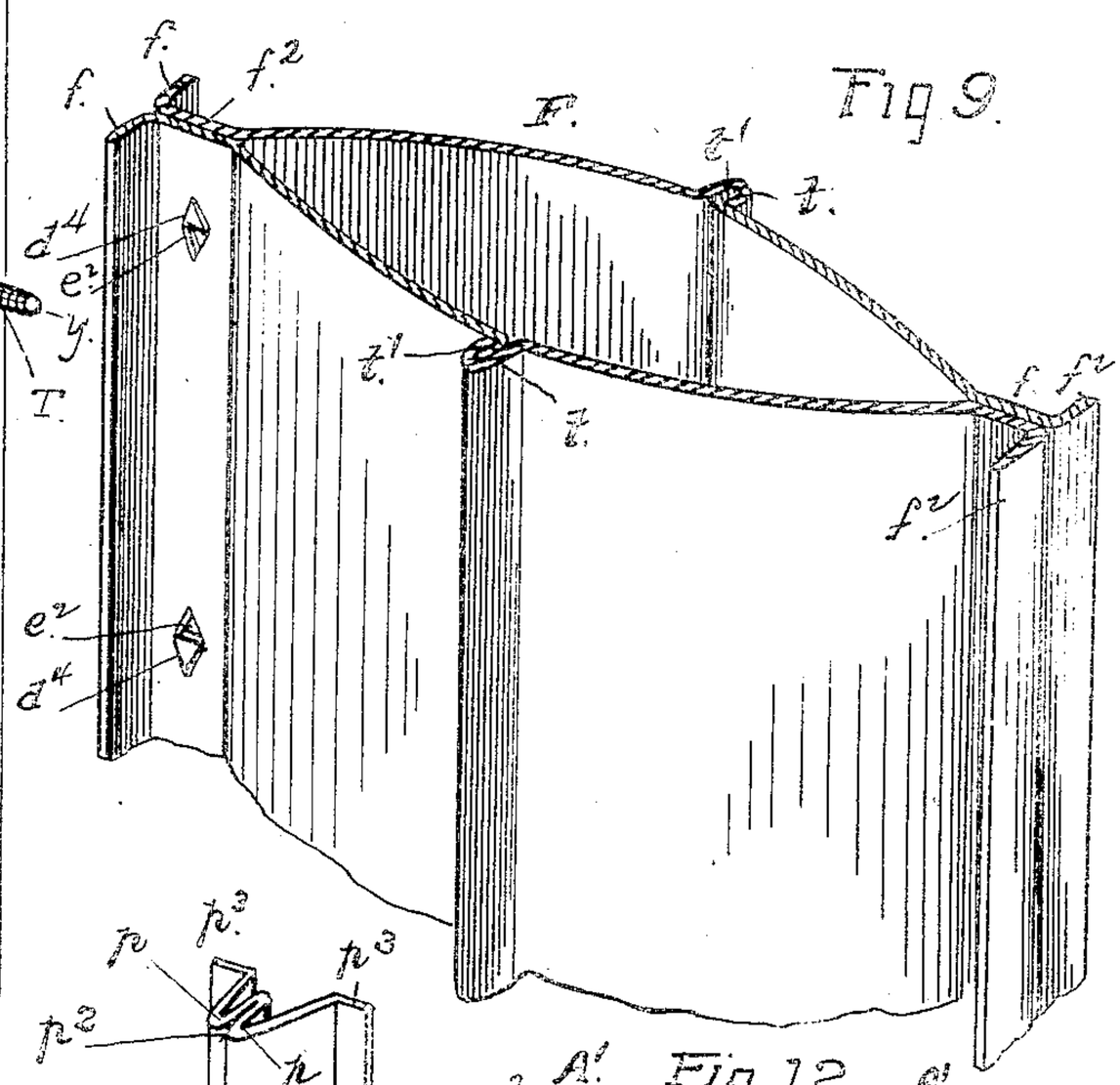

Fig. 9.

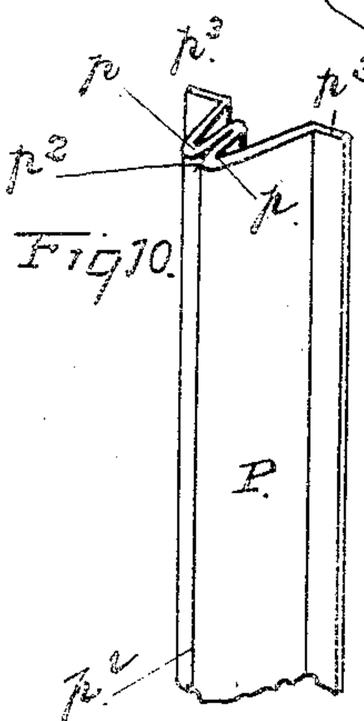

Fig. 10.

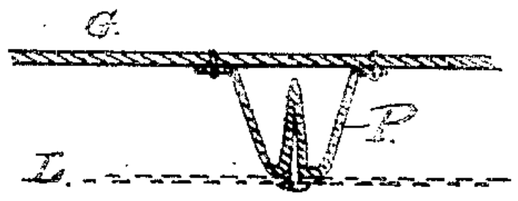

Fig. 11.

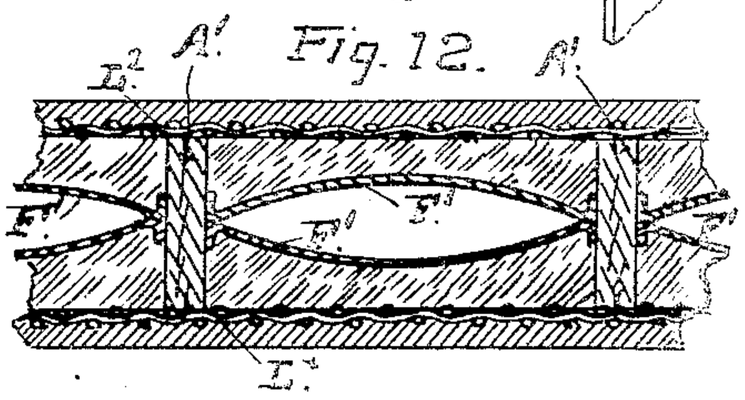

Fig. 12.

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Inventor:

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By E. G. Osborn Atty.

UNITED STATES PATENT OFFICE.

JOHN COSTER PELTON, OF SAN FRANCISCO, CALIFORNIA.

BUILDING CONSTRUCTION.

No. 930,610. Specification of Letters Patent. Patented Aug. 10, 1909.

Application filed January 8, 1906. Serial No. 295,200.

To all whom it may concern:

Be it known that I, JOHN COSTER PELTON, a citizen of the United States, residing at San Francisco, in the county of San Francisco and State of California, have invented new and useful Improvements in Building Construction, of which the following is a specification.

This invention relates to improvements made in building construction in which spaced studs, beams and plates combined in various ways form a skeleton wall or a floor with hollow spaces that are filled with plastic material.

This invention has for its object the production of a composite fire-proof structure for the walls, floor and other parts of a building, in which the requisite strength with a minimum weight of material and several other important qualities, such as rapidity in constructing, and a relatively low cost are obtained.

With these ends in view my invention embraces several novel features in the construction of spaced studs, beams or girders, braces and furring-strips, and the combination thereof with a filling of a plastic composition as hereinafter fully described and pointed out in the claims at the end of this specification.

The accompanying drawings herein referred to illustrate what I consider to be the best application and embodiment of my said improvements in the construction of an outer or an inner wall and the floor of a building.

Figure 1 is a view in perspective of a portion of a side-wall and floor in a building-construction embodying my invention, showing the inner face of the wall and also the floor broken away in several planes; Fig. 1ª is a vertical cross-section through the floor beam; Fig. 2 is a horizontal section through a portion of a wall structure before the lath and plaster finish are applied. Fig. 3 is a view in horizontal section through the sheet-metal members of the wall-structure, showing the parts separated, but in their relative position. Fig. 4 is a horizontal sectional-view of a portion of an outer wall showing the manner of arranging the plates to place, the filling of plastic material next the outside facing of the front of the building. Fig. 5 is a similar section of a portion of a wall in which the solid filling is situated next the inner facing or finish of the wall. Fig. 6 is a perspective-view of a portion of one of the metal studs. Fig. 7 is a horizontal cross-section through the stud on the line x—x Fig. 6. Fig. 7ª is a cross-section at x—y Fig. 6. Fig. 8 is a sectional-view of the two members of the stud before they are locked together. Fig. 9 is a view in perspective of the sectional sheet-metal braces or arched plates between the studs, showing the manner of locking the sections together. Fig. 10 is a perspective-view of a portion of a furring-strip. Fig. 11 is a cross-section of the strip. Fig. 12 is a modification in which studs of wood are used in place of metal studs.

One part or feature of my invention relates to a sheet metal stud, or beam, of novel construction formed of two parts or members of similar shape, each composed of a web or central portion having the two edges flanged or turned in the same direction at right angles to the web from end to end. The two members being placed back to back with their webs together; they are fastened together by tongues or strips d on one member and slits or openings e in the other member of the stud, through which the tongues are inserted and then bent back over the edge of the slits and finally clenched or flattened against the other member. The tongues d are formed in one way by cutting the metal of the web on three lines extending around the three sides of a rectangle and then bending the separated portion laterally on the remaining side where it is attached to the web, so that it stands out from the opening e. The two members a a^1 of the stud being set together with the openings in alinement, the tongues d on one member are inserted through the slits e in the opposite member with which they stand in line, and while the tongue at each opening in one member is clenched over the edge of the slit in the other, through which it is inserted, the corresponding tongue on the other member is turned through the same slit and clenched in the opposite direction. This will be understood by referring to Figs. 7 and 8 of the drawing in which the tongues d—d^2 that are formed of the metal of the member a are clenched against the web of the other stud-member a^1, whereas the tongues d^1 d^3 of the stud-member a^1 are inserted through the openings from the opposite direction and clenched against the member a. The interlocking tongues being thus bent and clenched

in opposite directions hold the two members *a a*[1] closely together quite as effectively for the purpose as they can be united by rivets and at considerable less cost of labor and time. It will be obvious that the tongues can be cut out of the metal webs in other forms or shapes, as for example, of a triangular shape as illustrated in Fig. 9, where the same mode of fastening two plates together is applied to the arched plates or braces F. The number of tongues and slits required for fastening together the members of the stud, will depend on the dimensions of the stud, but usually they are arranged in two rows extending lengthwise of the stud and spaced at regular intervals apart, with the tongues in one row spaced to alternate with those in the other row, as shown in Figs. 6 and 7. In that arrangement also the portion of metal that is separated from the web to form the opening *e* is left attached on one side to the web to form a tongue at each opening so as to provide each stud-member with a tongue to enter the opening of the other stud-member, and also with an opening to receive the tongue of such opposite stud member. It should be understood, however, that one of these tongues at every opening may be omitted or dispensed with by removing it altogether at the time of cutting the openings without departing from the esential feature of the construction; as for example by cutting off the metal that is left on the stud-members to form the tongues *d d*[1] and using only the tongues *d*[2] *d*[3] for the fastening means.

In constructing a wall, a number of studs A are set upright at required intervals apart, and between them are placed arched plates or braces F extending from one stud to the next, with the ends of the braces resting against the studs. In the preferred construction each brace is composed of two arched plates flanged at the ends to increase the extent of bearing surface between the ends and the studs against which they rest as well as to stiffen the edges of the metal, and having flat portions inside the flanges *f*, from which the arched portion of the plate springs in a curve of greater or less radius, according to the distance between the studs. These arched plates F being set together in pairs in the space between two studs inclose a central space between them and also divide the space between the studs longitudinally through the middle into two compartments which are closed in on the outer side by fixing the plates or sheets G to the flanged edge of the studs. These plates are of such dimensions that the joints fall on the line of the stud when the joints run vertically, as shown in the construction illustrated in Fig. 1, although this is not essential in all cases, as the plates may be laid together with the joints running horizontally. After a number of studs are set up and the plates G secured in place in this manner the arched braces are placed in position between the studs, after which the spaces between the braces and the outer plates and the studs are filled with a composition or mixture in a plastic state having the quality of becoming hard and solid when set, but the space inside the brace is left hollow or unfilled. The material for this purpose should be sufficiently plastic at the time of use to fill the space in the skeleton-frame inclosed by the outer plates and the braces and openings in the studs through which the space on one side of each stud is in communication with the corresponding space on the opposite side, so that on becoming set the filling will form a solid body extending on some lines continuously and longitudinally of the wall both in a horizontal and in a vertical direction. Any of the well-known compositions of plaster or of mixtures used in concrete construction are well adapted for the filling. It should be mentioned, however, that the skeleton-frame by virtue of its peculiar construction and the disposition of the parts with relation to the filling has the effect not only to reduce the quantity or mass of the filling required; but also to allow a lighter and less dense quality of composition to be used to advantage. By reason also of the peculiar form and manner of combining the metal parts or members of the structure, metal of relatively light weight and small gage can be used with safety.

In one application of this construction the plates G are fastened in place temporarily to retain the concrete filling until it has become set, and are then removed so as to expose the face of the concrete. When the plates are to be removed I secure them temporarily by means of long bolts T, passed through the channels *u* which are formed in the studs *a a*[1] for that purpose, as seen in Figs. 6 and 7[a], in which thumb-nuts T[1] are screwed after the plates G are placed in position. By this means the plates are readily removed after the concrete has become hard.

The same parts that enter into the construction of a wall apply as well to the construction of the floor of a building; the only difference between the two constructions consisting in the use of a single arched brace between the beams, instead of two oppositely-set arches, and in the omission of the filling material from the space on one side of the brace.

Figs. 1–4 and 5 represent the two constructions embodying the above-described features; and Fig. 4 may be taken to illustrate a vertical cross-section of a floor with the under surface finished with lathing and plastering for a ceiling to the apartment

below, and the top surfaces covered with flooring or tiling.

Additional strength to resist angular strain is secured in the floor-beam when found necessary, by running a rod or a wire cable W through a channel *y* formed for that purpose in the members of the beam, as seen in Figs. 1 and 1ª. The channels *y* are formed in the plates of which the beam is formed before they are locked together.

When this construction is employed for the front wall of a building a facing of brick or stone or cement covering the outer plates—indicated at D Fig. 5—is tied to the plates at intervals by anchors, tie-rods or strips of metal secured to the plates at intervals between the courses and embedded in the mortar.

When the surfaces are finished in plaster a foundation of sheet-metal or wire-lathing L is prepared by fixing furring-strips at intervals apart against the plates and fastening the lathing in place by nailing into the strips. The furring-strips which I have provided for this purpose are of novel character in being formed with a nail-groove, or channel p^2, into which nails may be readily driven to fasten the lathing at different points along the strip. This construction and the manner of securing the strips to the plates of the skeleton-frame and the lathing to the strips, will be clearly understood from Figs. 4, 5, and 11 of the drawings. A strip of sheet-metal of proper width and length is bent upon itself along a central line, and each half is then bent back longitudinally on a line parallel with the central bend, as at *p p* Fig. 10, so that the strip has a form in cross section resembling the letter M with the middle members compressed. The outer edges of the strip are then turned outward at an angle as seen at p^3, thus forming flanges by which the strip *p* is secured to the outer plates. These flanges are usually punched for nailing. The advantage of this form of furring-strip lie in its furnishing a backing into which nails may be driven at any point in its length, so long as they are driven along the line of the channel p^2 with the result not only to insure a firm hold of the nail, but to greatly reduce the time and labor in fixing the lathing in place. A furring-strip of this character is applicable to the plaster finish for the inner or the outer wall, or for the ceiling.

Other characters or forms of finish may be substituted for the lath and plaster, such as embossed plates of sheet-metal, or other material, to the use of which this construction is well adapted. The ceiling on the under side of the floor in Fig. 1 is shown as having a finish of such character in place of the lath and plaster indicated in Fig. 4.

Figs. 4 and 5 indicate slight modifications of the wall-construction in which the brace between the studs is composed of a single arched plate. In the arrangement shown in Fig. 5 the relative position of the concrete portion and the hollow spaces in the wall are reversed, the thicker portion of the wall being situated on the inside of the building.

The construction shown in Fig. 4 is recommended for inner walls and in those situations where the inner face of the wall is not exposed to extraordinary lateral pressure or impact.

The construction shown in Fig. 5 is well adapted to buildings where the walls are not required to carry a heavy load or stand other heavy strains. The parts of the skeleton-frame are so arranged and combined in Fig. 4 that the thick and more solid portion of the wall is turned outward whereas the inner face of the wall may be exposed to rought treatment as in a factory, shop or warehouse.

The construction illustrated in Figs. 1 and 2 are preferred for walls that are carried up to any considerable height or are exposed to heavy strains and stress.

The metal parts of this structure are made of such dimensions that they can be handled and set in position without difficulty, the studs being usually put together in the shop, and the braces made in sections of convenient length or height to be placed in position between the studs as the work is carried upward. In one form of brace in which double arched plates are joined together with their convex sides turned outward, the two members of the arch are formed each of two sections fastened together by rivets, or preferably by interlocking tongue and slit fastenings as shown in Fig. 9, and the sections composing one arch or member are united by a locking joint consisting of a flange on the edge of one, and a groove on the edge of the other section. Each unit or section of brace is thus composed of two members united by joints extending vertically through the middle of the brace. This construction is well adapted for long and relatively heavy braces, as it enables the parts to be made in pieces or sections that can be readily handled or set in place. A lighter form or character of brace, on the other hand, may be formed of two single arched plates, which may or may not be secured together before they are placed in position. It should be mentioned that the brace-sections are formed or arranged to join together one upon another by butt joints, when set in place between the studs; one section being lowered from above upon the previously set brace so as to rest upon it.

The interlocking edges of the sections in the construction illustrated in Fig. 9 has the advantage of forming spacing ribs or projections on the convex sides of the braces

that serve to center the brace and keep it at equal distance from the outer plates that are placed against the studs.

Fig. 12 illustrates a modification in which studs of wood are used in the structure in place of metal studs, thereby reducing the cost of construction to some extent, but chiefly affording a light construction that is well adapted for inner walls or partitions. In this construction lathing L^x is nailed directly to the studs, and the braces F^1 divide the space between the studs into compartments that are filled with the plastic composition. This structure will be found to possess good fire-proof qualities on account of the wood being embedded in and covered by the body of plastic material on both sides. Where the conditions admit of the metal lathing being placed directly against the studs so that it serves to retain the filling of plastic material between the studs and also forms a foundation for the plaster finish, the construction can be further simplified and its cost reduced by omitting the metal plates and using the well-known perforated sheet metal lathing or that which is formed of twisted or woven wire.

The foregoing description is intended to apply to metal lathing as well as to metal plates for closing in the sides of the skeleton frame to confine and retain the filling of plastic material. The term metal plates should be understood, therefore, to embrace lathing made of wire or of perforated sheet-metal.

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

1. In a building construction, the combination of studs spaced apart and provided with apertures, arched braces supported between said studs, and a filling of concrete between the said studs and extending through the apertures therein and arranged on both sides of the arched braces, substantially as set forth.

2. In a building construction, the combination of studs spaced apart, arched braces mounted between the studs the braces being formed each of a pair of curved or arched plates with flanged edges, the plates being set together to inclose an open space between them, and with their flanges resting against the studs, and means secured to the studs for supporting the plaster of the wall, substantially as set forth.

3. In a building construction, the combination of studs spaced apart, plates secured to the studs, and metal furring strips secured to the plates, the furring strips being substantially M-shaped in cross section, the middle members of each strip lying close together to form an outward-opening nailing groove and the outer members of the strip being formed with flanges by which the strip may be secured in place to the face of one of the said plates, substantially as set forth.

4. In a building construction, the combination of studs spaced apart, arched braces mounted between the studs, a filling of concrete or the like between the studs and inclosing the arched braces, plates secured to the studs, furring strips formed with nailing grooves and attaching feet by which they are secured to the face of the plates, and supporting means for the plaster attached to said furring strips, substantially as set forth.

5. In a building construction, the combination of studs spaced apart and provided with apertures, braces arranged between said studs, plates extending from one stud to the next and secured thereto, and a filling of concrete or the like between the studs and between the braces and the plates, said concrete filling extending through the apertures in the studs so as to form a continuous composite structure, substantially as set forth.

6. In a building-construction, the combination of spaced studs each formed of a pair of flanged members secured together with the flanges extending at right angles to the web of the stud on opposite sides of the line of separation between the said members, outer plates secured to the studs, and arched braces in pairs having flanges on the ends, adapted to extend across the space between two adjacent studs and rest against the studs.

7. In a building-construction, the combination of studs arranged at intervals apart and having spaced openings through them, arched braces between the studs dividing the space between two adjacent studs, outer plates secured to the studs and inclosing the divided spaces on opposite sides of the arched braces, and a mass of plastic material filling said spaces and the openings through the studs.

In testimony whereof I have hereunto set my name to this specification in the presence of two subscribing witnesses.

JOHN COSTER PELTON.

Witnesses:
EDWARD E. OSBORN,
HARRY J. LASK.