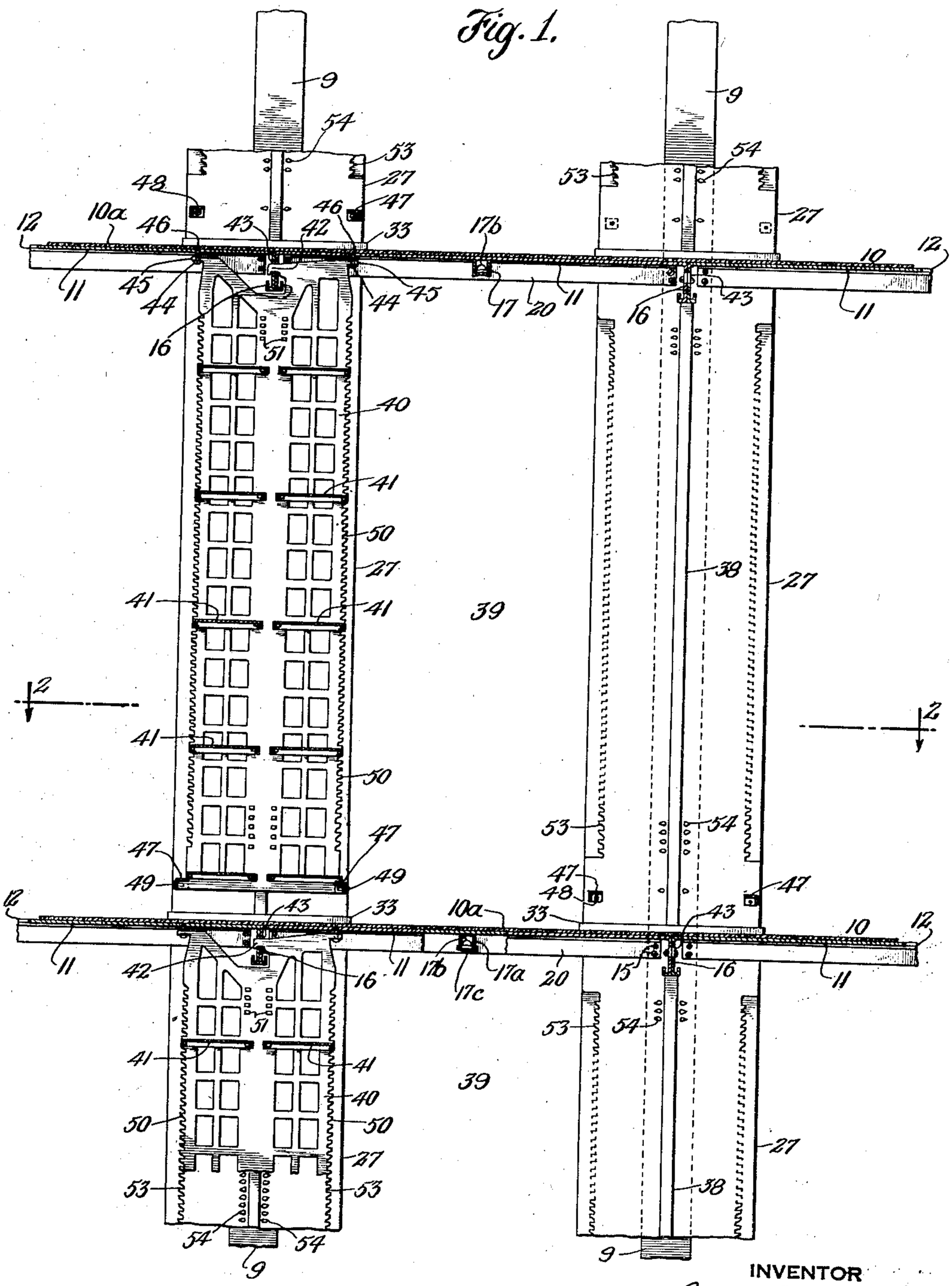
Aug. 2, 1938. A. S. MACDONALD 2,125,302

LIBRARY CONSTRUCTION

Filed April 23, 1935 6 Sheets-Sheet 1

Fig. 1.



INVENTOR

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LIBRARY CONSTRUCTION

Filed April 23, 1935 6 Sheets-Sheet 2

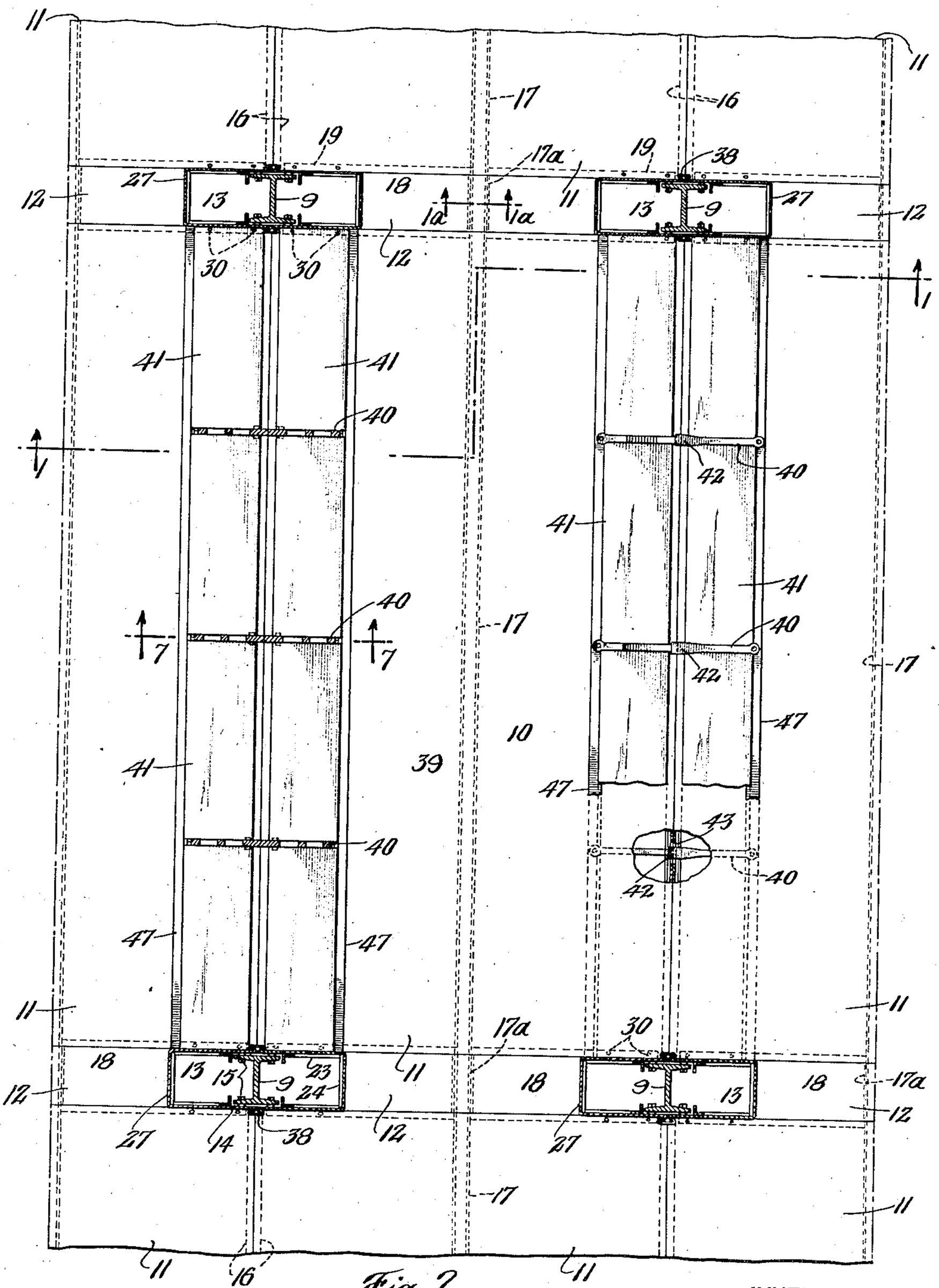

Fig. 2.

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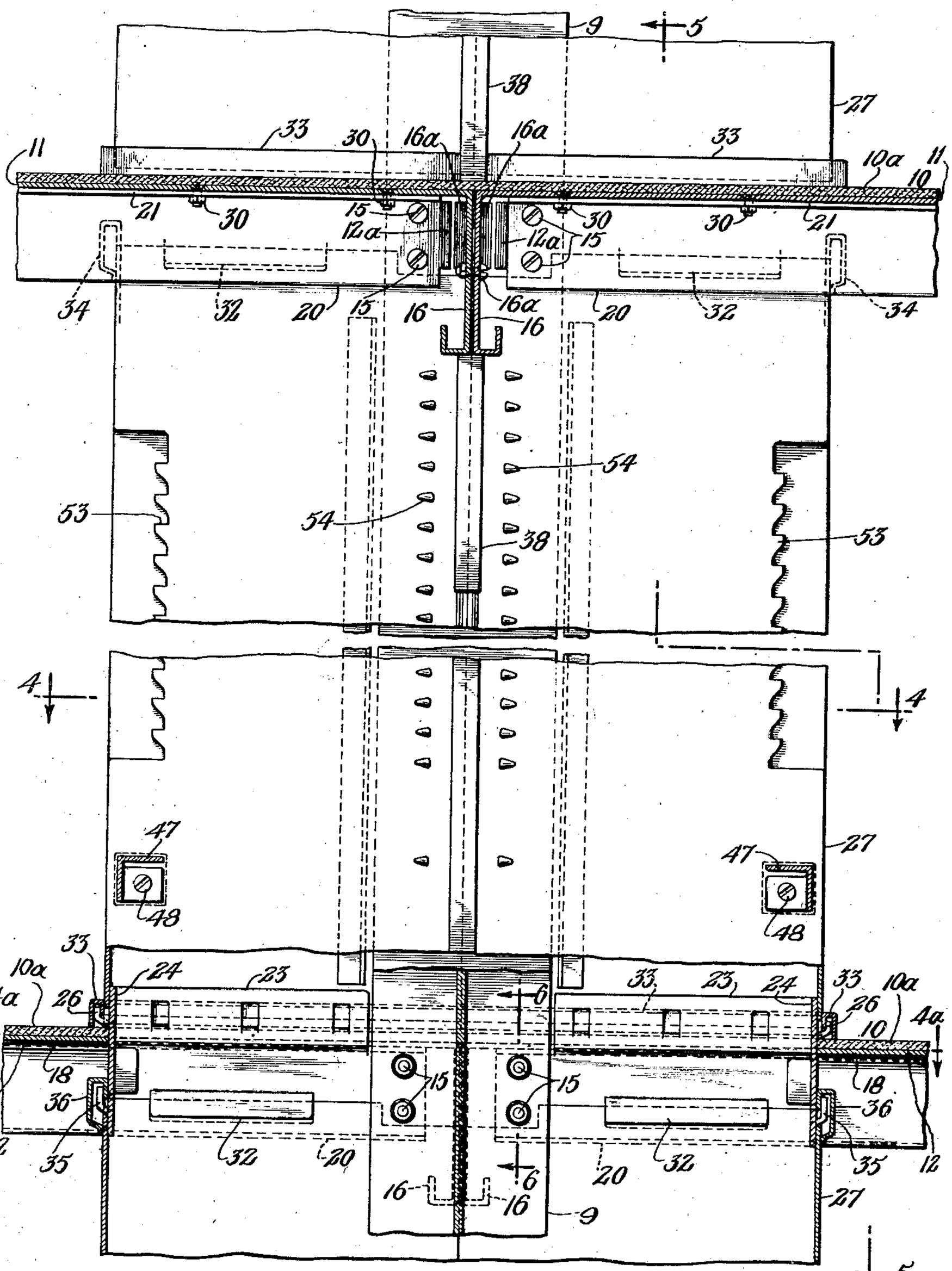

Fig. 3.

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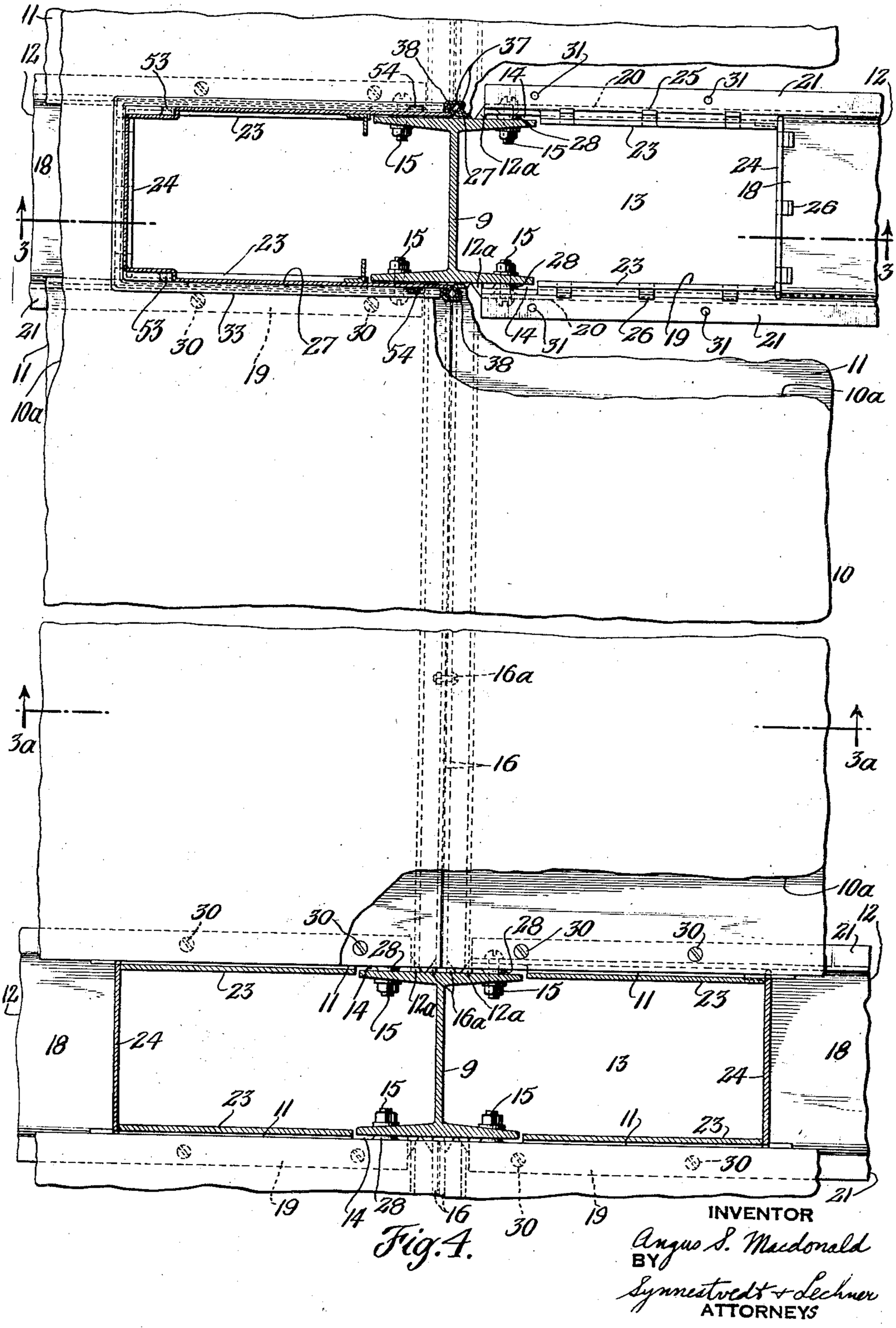

Fig. 4.

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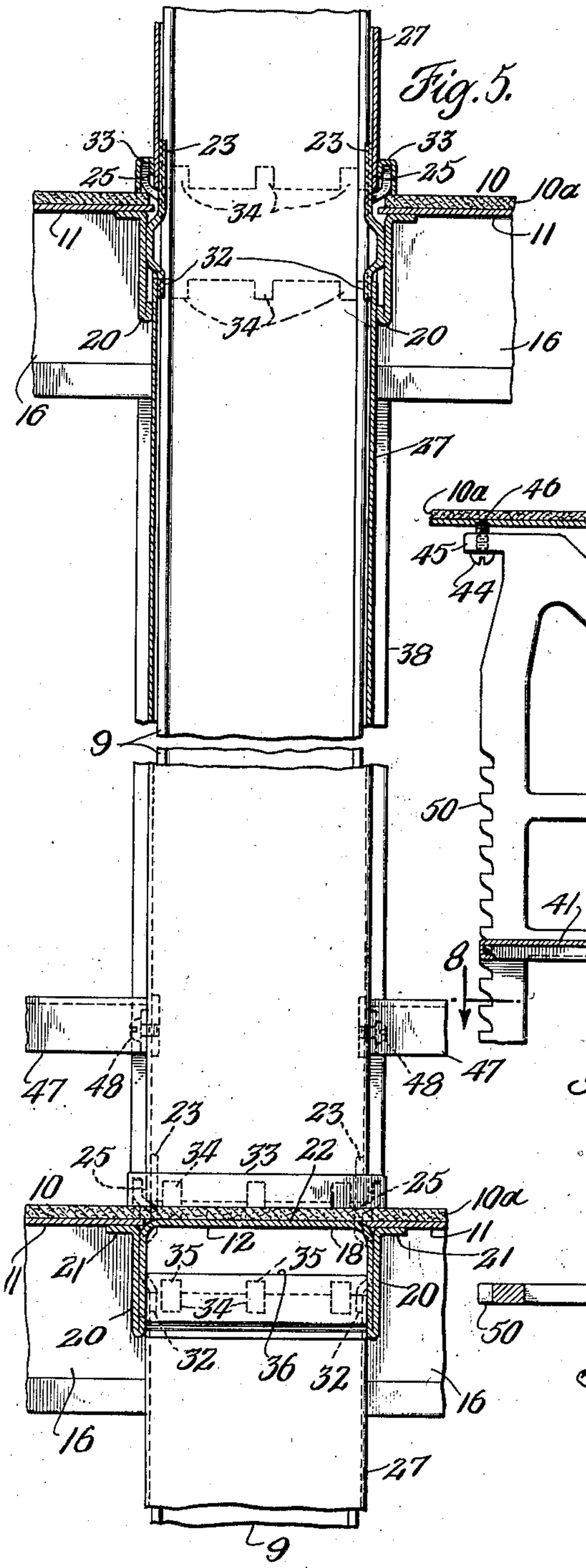

Fig. 5.

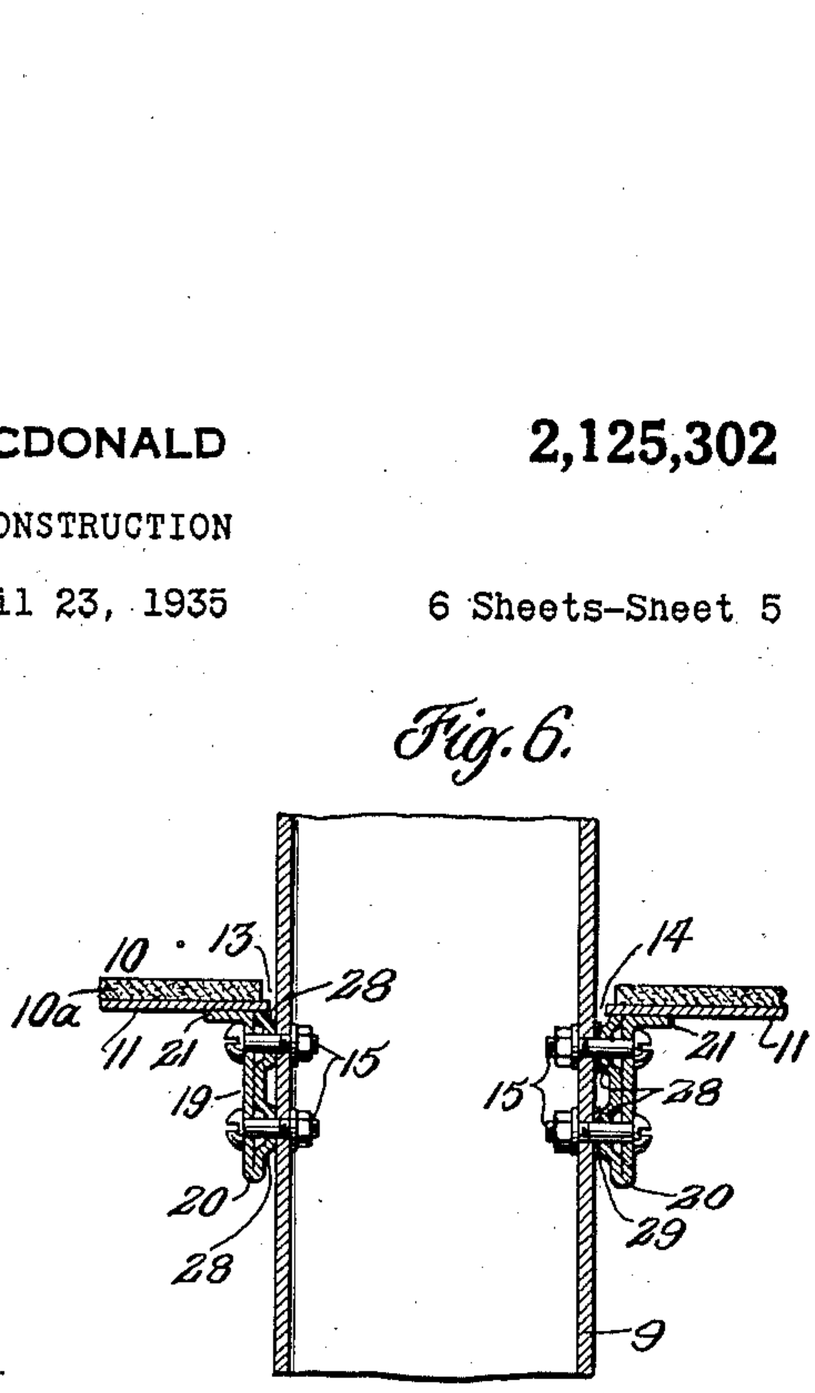

Fig. 6.

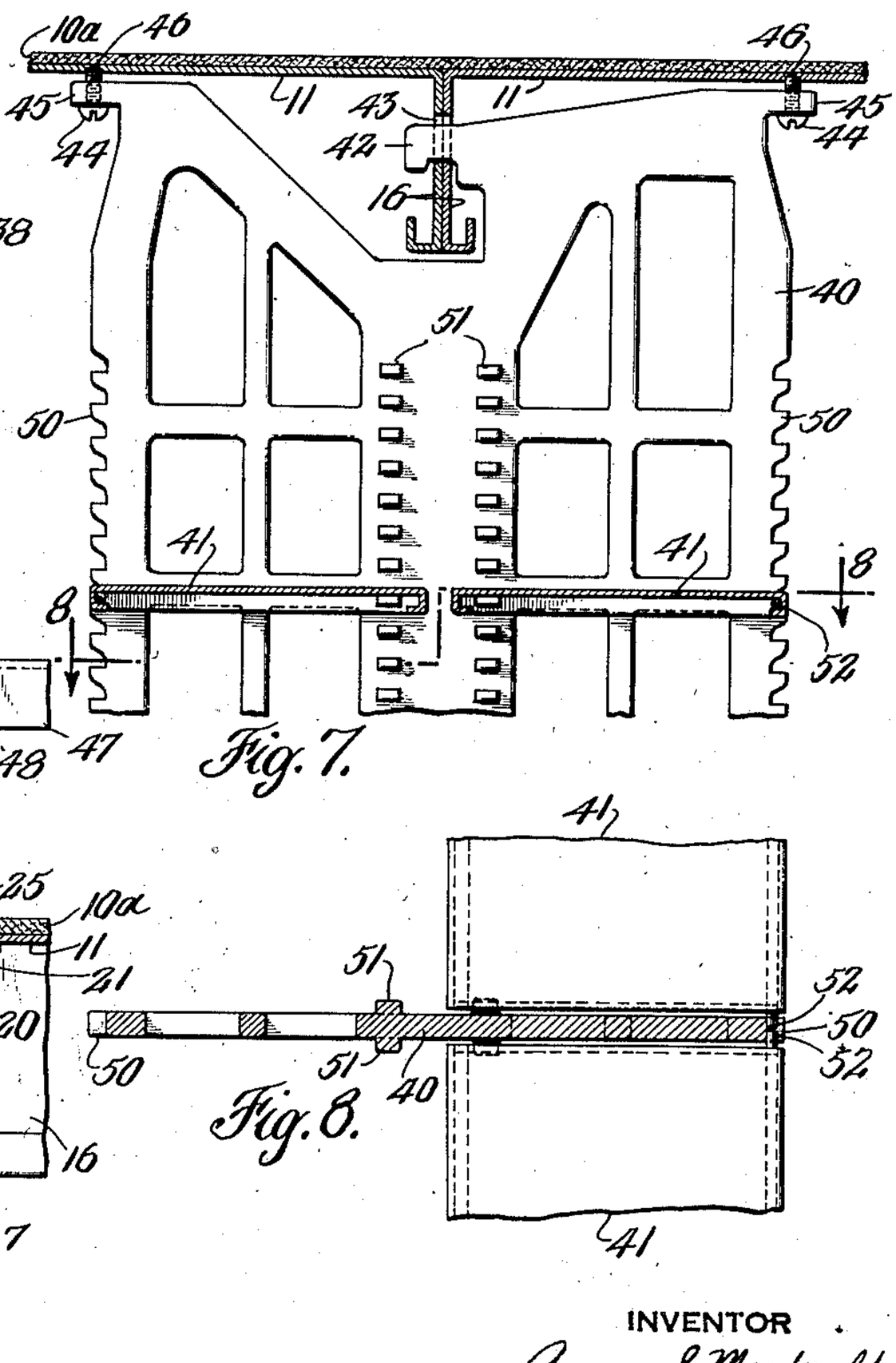

Fig. 7.

Fig. 8.

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LIBRARY CONSTRUCTION

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Fig. 9.

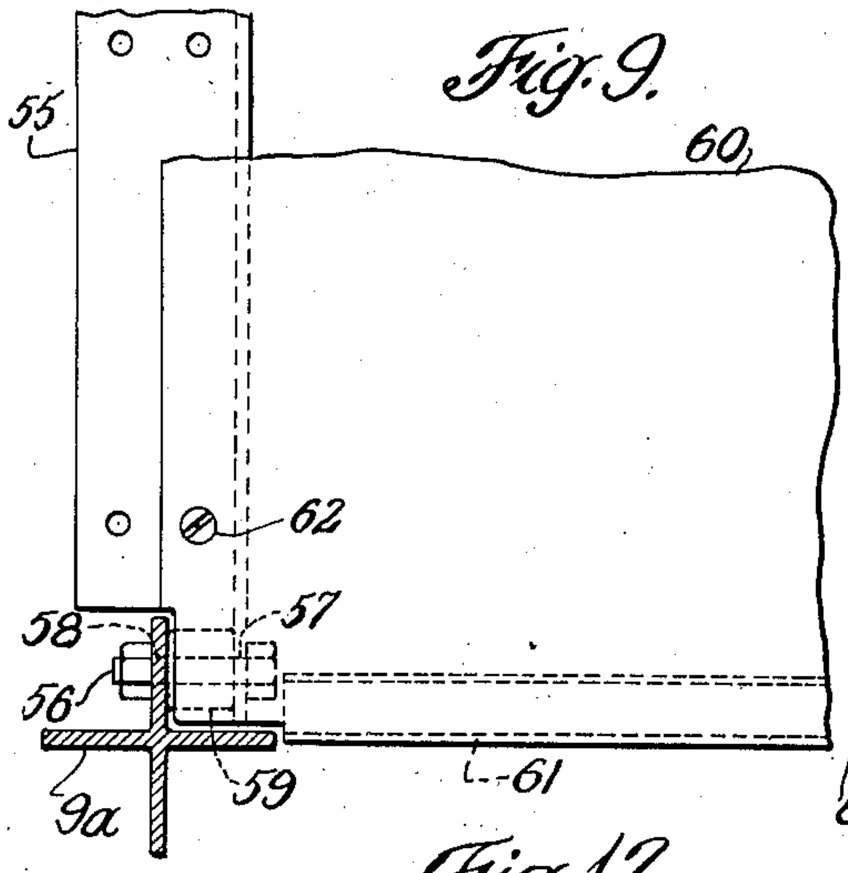


Fig. 10.

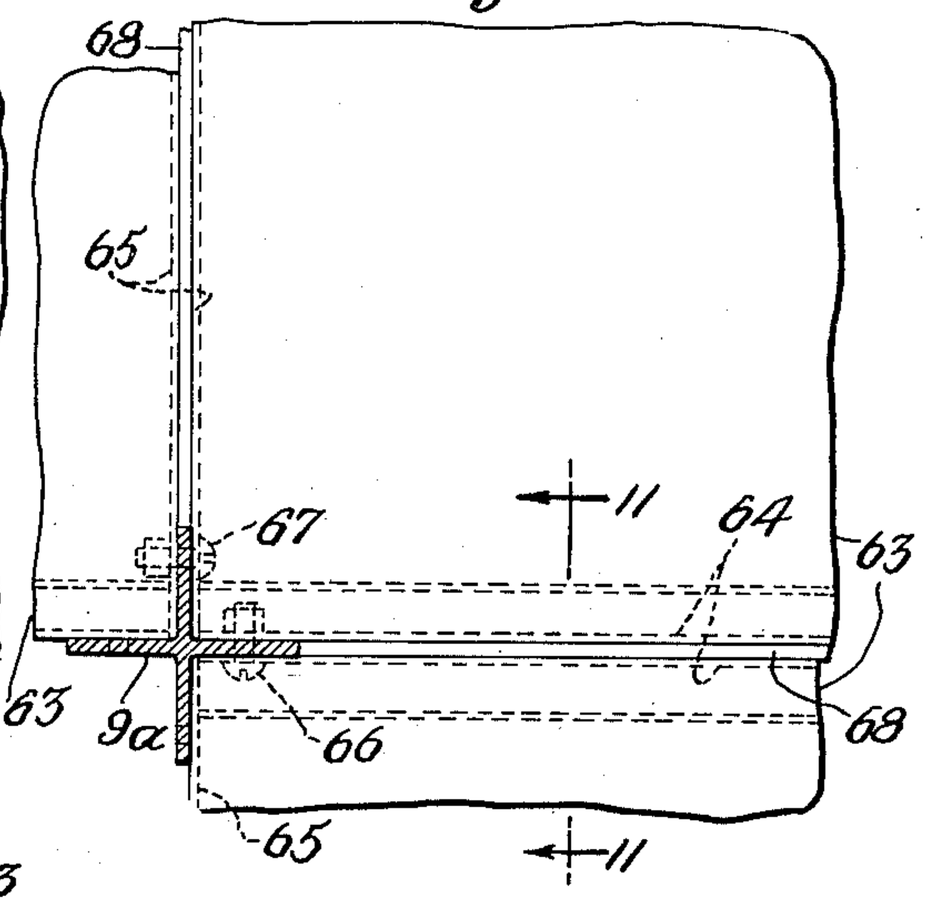


Fig. 12.

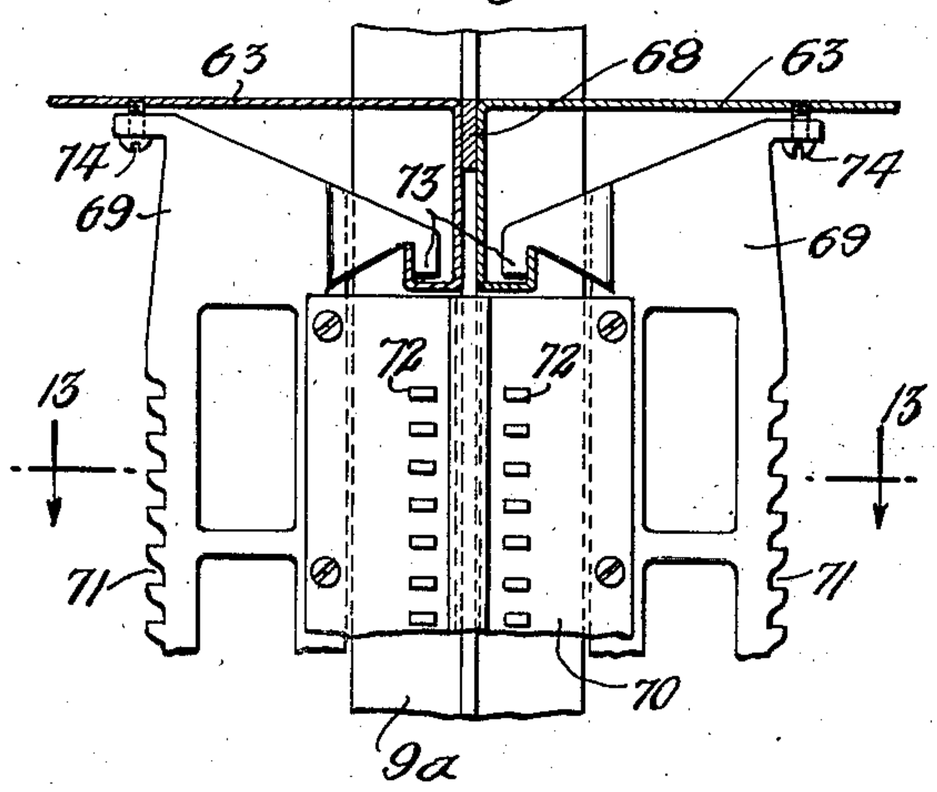


Fig. 11.

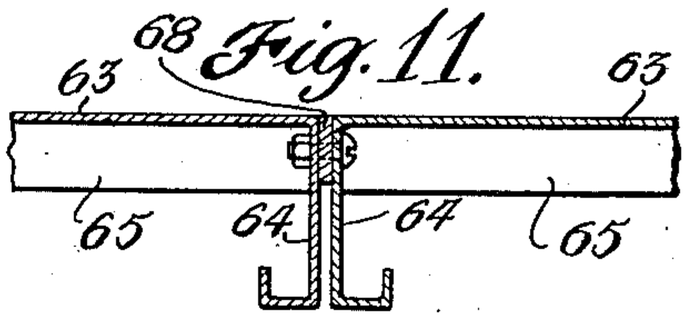


Fig. 14.

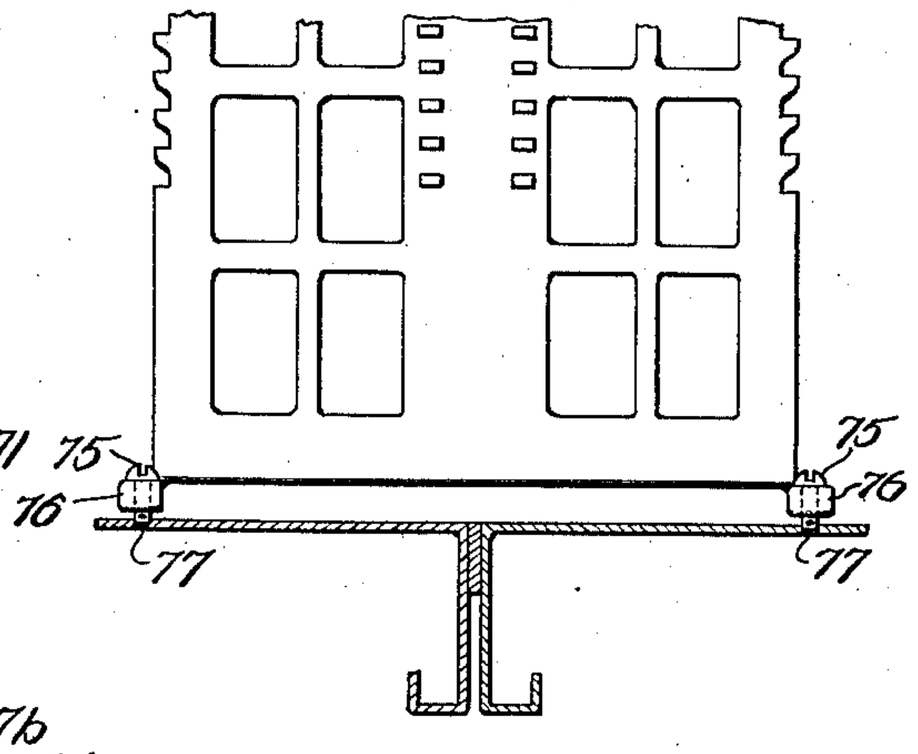


Fig. 13.

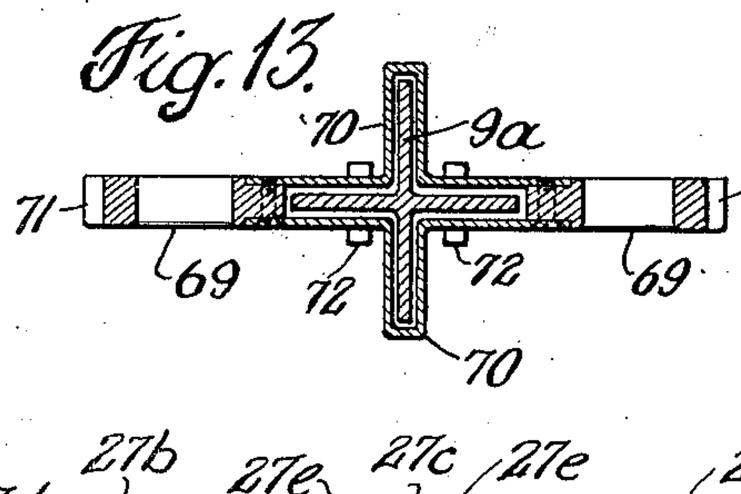
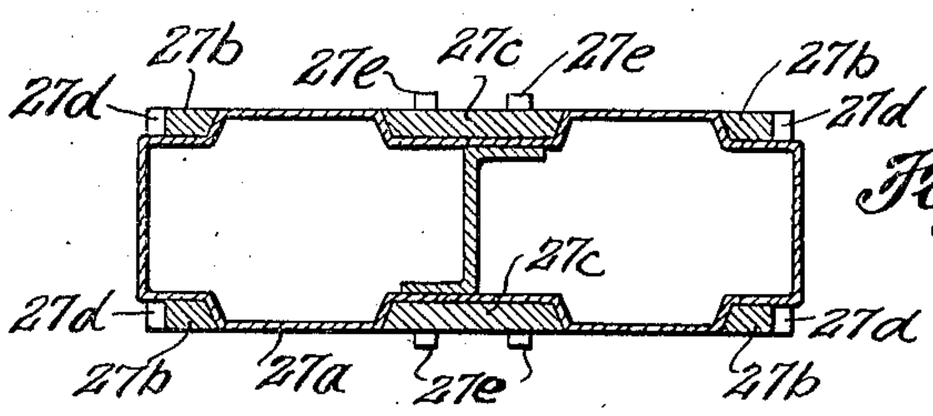


Fig. 15.



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Patented Aug. 2, 1938 2,125,302

UNITED STATES PATENT OFFICE

2,125,302

LIBRARY CONSTRUCTION

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Application April 23, 1935, Serial No. 17,777

28 Claims. (Cl. 189—34)

This invention relates to library construction.

I propose to provide a very simple inexpensive arrangement which does away with many of the parts heretofore employed, and which is easy to assemble and which, when assembled, provides a strong, stiff construction.

I also propose to provide a floor construction which is carried from or supported by the columns and in turn supports the columns, which floor construction is a self contained unit whereby it may be composed of prefabricated, uniform members which, when assembled, give fixed predetermined relationship between the various parts, and particularly shelf supporting parts.

More specifically stated I provide a library construction in which the floor is comprised of a plurality of prefabricated floor members from which the shelf supporting parts of the library are supported and positioned.

I further propose a library construction composed of columns arranged on fixed centers and in rows extending at right angles to one another, and a floor composed of a plurality of floor members each of which occupies the rectangular area cornered by four columns, and in which the shelf supporting parts of the library are supported and positioned from these floor members.

Another object resides in the provision of a structure of the character just above mentioned, in which various floor members are so correlated with respect to one another that they provide openings for the columns, which openings have at least sufficient clearance to take care of the tolerances permitted with respect to the columns as to size and of various other irregularities and variations normally incident to the columns, such, for example, as the slight warping or twist which is frequently encountered.

I also aim to support floor structure of the above character from the columns by a means which is variable to the clearance so that not only is the floor structure firmly supported from the columns but such structure firmly, laterally braces or supports the columns.

More specifically I propose a floor construction composed of sets of sheet metal plate members, reinforced preferably largely by preforming them with reinforcing portions, so that the plate members constitute their own frames and when assembled constitute a self-contained floor. I propose to secure these strong accurately preformed plate members to the columns so as to square the structure, making it firm and rigid.

I also propose to enclose the columns with casing members which may be used for conduits and which casing members also constitute a portion of the book supporting structure.

More specific and detailed objects and advantages are also contemplated by my invention and these will appear in the following portions of the specification.

How the foregoing, together with such other objects and advantages as may hereinafter appear or are incident to my invention, are realized is illustrated in preferred form in the accompanying drawings, wherein—

Figure 1 is a sectional elevation of a library construction in accordance with one form of my invention, the section being taken substantially on the lines 1—1 and 1*a*—1*a* of Figure 2, with certain of the book supporting structure being omitted in portions of the view.

Figure 2 is a plan section taken substantially on the line 2—2 of Figure 1, with a portion of the book supporting structure broken away in the right-hand part of the view.

Figure 3 is an enlarged, fragmentary, vertical section, the lower portion of which is taken substantially on the line 3—3 of Figure 4, and the upper portion of which is taken substantially on the line 3*a*—3*a* of Figure 4.

Figure 4 is a fragmentary plan section taken substantially on the lines 4—4 and 4*a*—4*a* of Figure 3, the upper portion of the view being taken on the line 4—4 and the lower portion on the line 4*a*—4*a*. Certain of the parts are shown broken away in this figure in order to better show the construction of other parts.

Figure 5 is a framentary vertical cross-section taken substantially on the line 5—5 of Figure 3.

Figure 6 is a fragmentary cross-section taken substantially on the line 6—6 of Figure 3.

Figure 7 is a fragmentary enlarged cross-section taken substantially on the line 7—7 of Figure 2, with a pair of book shelves shown in place and illustrated in cross-section.

Figure 8 is a fragmentary plan section taken substantially on the line 8—8 of Figure 7.

Figure 9 is a fragmentary plan view of a modification of my invention.

Figure 10 is a fragmentary plan view of another modification of my invention.

Figure 11 is a cross section taken on the line 11—11 of Figure 10.

Figure 12 is a fragmentary sectional elevation illustrating modified structure employed at the columns.

Figure 13 is a plan section taken on the line 13—13 of Figure 12.

Figure 14 is a fragmentary view illustrating a modification in the shelf supporting members.

Figure 15 is a fragmentary plan section illustrating another modification of the invention.

My improved library construction comprises in general a plurality of columns 9 arranged on fixed centers and in rows extending at right angles to one another, as shown in Figures 1 and 2; a self-contained floor structure 10 comprised of a plurality of metal plates or floor members, a given number of which will occupy a predetermined area, preferably the floor area of the library building; and book supporting structure which is supported and positioned from the floor members.

In the form of my invention shown in Figures 1 to 6 the columns 9 are illustrated as being H-beams and the self-contained floor structure 10 is comprised of a plurality of cooperating metal plates or floor members 11 and 12. The construction and correlation of these plates is such that a plurality of openings 13 are provided in surrounding relation to the columns and with clearance 14 therearound. Means 15 is provided for vertically positioning the floor structure with respect to the columns, the construction being such that the floor structure is supported from the columns and laterally braces or supports the columns.

Referring now to the sets of members which, when assembled, constitute the self-contained floor structure, the plates 11 of the one set are rectangular and of uniform size and each occupy the space between a set of four adjacent columns, and the plates 12 of the other set are also rectangular and of uniform size and each occupy the space between a pair of columns of a row and lie between adjacent pairs of the plates 11, so as to fill the space at the ends of the plates 11. As is best seen from inspection of Figure 2, the length or long dimension of the plates 11 extends longitudinally of the book supporting structure and is of such dimension that the plates extend substantially from the broadside of a pair of columns to substantially the facing broadside of the next pair of columns in this longitudinal direction. The width or narrow dimension of the plates 11 is such that they extend from the center line of a row of columns to the center line of the next adjacent row of columns crosswise of the installation. Thus the area of the plates is such that they are cornered, so to speak, by four adjacent columns.

The plates 11 are stiffened or reinforced along their longitudinal edges or sides by means of flanges 16 and are provided with centrally located, longitudinally extending, hollow reinforcing members 17, preferably of U-shape in cross-section and secured to the lower face of the plates as by means of welding. The members 17 may be used as a conduit for electric wires and, in order to make this conduit continuous, I employ conduit members 17*a* in the plates 12 in line with the members 17. Apertures 17*b* are provided in the flanges 20 of the plates 12. A removable cover 17*c* may be provided for the member 17*a* (see Figures 1 and 2).

The plates 12 of the other set are of channel shape in cross-section, as clearly shown in the lower portion of Figure 5. Each of these plates comprises a main or body portion 18 and bifurcated end portions 19, the main portion 18 being of a width to fill the space between the plates 11 and of a length to define end edges of the apertures which surround the columns. These plates are constructed of sheet metal formed into the shape of a channel with the metal re-bent at the side flanges 20 of the channels and then bent laterally outwardly at the top of the flanges to provide longitudinally extending lateral flanges or ledges 21 for supporting the floor plates 11. The web portion 22 of the plate is so located that the upper face thereof lies flush with the upper face of the plates 11, so as to provide a continuous flush floor surface. The flanges 20 extend longitudinally beyond the ends of the body portion 18 to provide the bifurcated end portions 19, it being noted that the ledges 21 extend for the full length of the flanges 20.

At the bifurcated end portions 19, I provide upstanding lips 23 and 24 (see Figures 3, 4 and 5), from which tabs 25 and 26 are outwardly struck for receiving casings 27, in spaced surrounding relation to the columns.

The channel flanges 20 of the plate-like members are spaced apart a predetermined distance somewhat greater than the maximum dimension that a commercial H-beam 9 of the size selected for the library will run. For example, commercial 6 inch H-beams vary in thickness across the flanges, say, from 5⅞ inches to 6⅛ inches, although this oversize and undersize tolerance may vary somewhat in different steel mills. Therefore, when using a 6 inch H-beam, the flanges 20 would be spaced apart somewhat more than 6 inches in order that the bifurcated ends of the plates 12 will straddle the H-beams with clearance even if applied at the point of maximum thickness.

As illustrated in Figures 4 and 6, I prefer to provide inwardly projecting bosses 28 on the inner faces of the flanges 20 adjacent the end portions of the bifurcated ends 19, the amount of projection of which is preferably such that the distance between the faces of the bosses is equal to the maximum dimension across the flanges of the H-beam, so that the bifurcated end portions will fit the H-beam at its maximum dimension. These bosses are provided with holes to receive the securing means 15 illustrated in the form of bolts which pass through the corresponding holes in the flanges of the H-beams. In order to take up the clearance which will exist wherever the H-beams are under maximum dimension, I provide take-up means in the form of washers 29, as illustrated in Figure 6.

In constructing a library in accordance with this form of my invention, I first locate the columns or H-beams on selected fixed centers in rows extending at right angles to one another, and then secure the floor plates 12 in place between adjacent columns by means of the apertures and securing means 15, employing the take-up means wherever necessary. I next lay the floor plates 11 on the laterally extending flanges or ledges 21 of the plate members 12 and secure them in place as by means of bolts 30 (see Figures 3 and 4) fitting accurately located holes 31 in the floor plates 11 and 12. These holes and bolts constitute a controlling factor in providing accuracy in position and relationship of the plates and casings, and serve to square up the entire floor structure. The plates 11 may be secured together at the side flanges 16 by means of bolts 16*a*. Since the plate members 11 and 12 are well reinforced to constitute their own frames, it will be seen that when they are secured together, a very firm and rigid self-contained floor structure is provided, in which the openings 13 surrounding the H-beams are accurately located on predetermined centers cor-

responding to the fixed centers of the columns and, as has been pointed out above, the spacing of the channel flanges of the members 12 and the variable securing members 15 take care of the tolerance incident to the columns. The rigidity of the floor structure also will take care of straightening out other irregularities in the columns, such as slight warping or twist normally incident to the columns.

Additional support may be provided by welding the bifurcated end portions of the plate members 12 to the columns 9, as indicated at 12*a*, and by welding the ends of the flanges 16 of the plates 11 to the columns, as indicated at 16*a*.

Reverting now to the upstanding lips 23 at the bifurcated ends of the members 12, these are so located with respect to the side flanges 20 that a desired minimum amount of clearance will be provided between the faces of the flanges of the columns and the inside faces of the casings 27 where the columns are of maximum size, so that under all conditions the casings will fit the columns with clearance.

The casing 27 is made in two like halves, and is slipped laterally over the columns to be received by the tabs 25 at the bottom and by tabs 32 at the top, the tabs 32 being struck in from the flanges 20 of the members 12. A mop strip 33 is inserted between the casing and the tabs 25 and 26 at the floor level. These mop strips rest on a covering 10*a* of any suitable material which may be employed to cover the floor. It should be noted that the end walls of the column casing 27 are provided with top and bottom notches 34 which slip over the end tabs 26 and 35 of the members 12 (see Figures 3 and 5). A top trim member 36 is hooked in place over the tabs 35 just referred to. The mop strips 33 and the trim members 36 aid in holding the casings in position.

The two parts of the casing 27 are provided with bent portions 37 along their upright free edges and when they are positioned on the floor plates and around the columns, an upright cover member 38 is snapped in place through the medium of the portions 37 to close and hide the joints and serve as a locking means for the casing. It will be noted that, since the lips which position the casings at the top and bottom are located in predetermined spacing with respect to the columns, the predetermined amount of clearance above referred to is provided between the faces of the columns and the casing. In the other direction, the casings are very materially greater in size than the columns, and, as indicated in the drawings, this dimension is made to be a little greater than the depth of the book supporting structure which is associated with the columns, and now to be described. This relation is clearly shown in Figures 1 and 2 of the drawings. It is pointed out that these casings, therefore, are of ample size to act as air conduits, to receive electric wires, plumbing, and so forth, as may be desired.

The book supporting structure referred to is arranged in rows or ranges, as shown in Figure 2, with longitudinal aisles 39 therebetween. In the particular installation illustrated, the distance between adjacent columns is such that I prefer to employ three equally spaced supporting members or plate-like castings 40 intermediate of the columns for supporting the book shelves 41 which are arranged in double rows, as shown, to accommodate books from each aisle. These castings are supported and positioned from the floor structure in the following manner. Referring particularly to Figures 1, 2 and 7 it will be seen that I have provided a hook portion 42 on each of the castings for suspending the castings from the floors or decks. The hook portions 42 are located centrally of the top of the castings and engage holes or slots 43 in the flanges 16 of the floor plates 11 and, in order to properly align the castings, I employ means at the upper corners thereof adapted to engage the floor plates. In this instance, I have illustrated this means in the form of set screws 44 located in corner lugs 45 of the castings and projecting upwardly therefrom for reception in counterbores or indents 46 in the lower face of the floor plates. It will thus be seen that this means serves to position the castings in parallel relation to the broadside faces of the column casings and may also be employed to plumb up the castings and lock them in their hooked relation. At the lower corners of the castings, I employ angle irons 47 extending from column casing to column casing and secured thereto as by means of screws 48. These angles are secured to the lower corners of the castings 40 as by means of screws 49, as shown in Figure 1.

The shelves 41 may be adjustably positioned vertically of the castings by means of notches and teeth 50 provided at the upright edges of the castings and similarly spaced side lugs or projections 51 at the center portion of the side faces of the castings. End pins 52 are provided in the shelves for supporting purposes. The shelves 41 which come adjacent to the column casings are supported directly from the casings by means of notches and teeth 53 and projections or lugs 54 corresponding to the teeth 50 and lugs 51 respectively of the castings and preferably formed directly in the casing walls, as shown in Figures 3 and 4. As illustrated in Figure 15, the side walls of the casing 27*a* may be vertically corrugated or ribbed to provide stiffness and to receive shelf supporting strips 27*b* and 27*c* having notches 27*d* and projections 27*e* for the shelves. It will be seen from the foregoing that the book supporting structure is supported and positioned from the floor structure 10 because both the column casings 27 and the castings 40 which constitute part of the book supporting structure are positioned and supported from the floor structure. It is to be observed that, since the floor parts are so constructed and arranged that they become accurately located with respect to the columns and since the casings are accurately supported and positioned from the floor parts, any variations in the size of the columns incident to their manufacture will not be reflected in the spacing between column casings, and, therefore, the distance within which the book shelves are to be located is constant and predetermined, thus enabling the use of shelves of fixed length without the necessity of fitting operations in the field.

In the modification illustrated in Figure 9, cruciform columns 9*a* are employed with angle irons or stretcher members 55 extending from column to column of the rows in one direction. These members may be said to correspond to the members 12 of Figure 1 and are secured to the columns as by means of bolts 56 passing through holes 57 in the side flanges of the angle irons and through holes 58 in the columns.

In order to bring the center of the top flange of the angle irons on the center line of the columns and to otherwise properly locate the angle irons, I preferably employ washers 59 between

the side flanges and the columns. Floor plates 60 having side flanges 61, similar to the flanges 16 of the floor plates 10, extend from one angle member 55 to the next and are secured thereto by bolts 62. These floor plates are of such dimensions as to occupy the rectangular area which is cornered by four adjacent columns. The ends and sides of adjacent floor plates abut so as to form a complete floor surface.

If it is desired to employ column casings in this form of my invention, they may be supported and positioned from the floor plates in a manner similar to that above described and may constitute the end members of the book supporting structure. The side flanges 61 of the floor plates serve as a means from which castings similar to the castings 40 above described may be suspended.

In the modification illustrated in Figures 10 and 11, I employ floor plates 63 having side flanges 64 and end flanges 65. As before, these plates are of dimensions such that they occupy the rectangular area which is cornered by four adjacent columns. The plates are attached to the columns at the corners by means of bolts 66 and 67 passing through the flanges 64 and 65 and the columns. Filler members 68 are employed between the sides and ends of adjacent floor plates to provide a continuous floor surface. Column casings and intermediate castings may be supported and positioned from this floor structure in a manner similar to that described above.

In some instances, I contemplate employing shelf supporting structure, such as illustrated in Figures 12 and 13, at the columns which comprises a pair of castings 69 arranged on the center line of the column and connected by means of a pair of members 70 straddling the column. The castings are provided with notches 71, and the members 70 with lugs 72 for the shelves. The assembled support is suspended from the floor plates at 73 and is positioned by set screws 74 much in the manner illustrated in Figure 7.

These assembled supports may be connected with intermediate castings, such as illustrated in Figures 7 and 8, by angle irons 47 as illustrated in Figures 1 and 2.

In Figure 14, I have shown a modification in the lower portion of the shelf supporting castings whereby the castings may be positioned and steadied at the bottom and comprising set screws 75 passing through lugs 76 in the castings and engaging holes or indents 77 in the floor plates.

In connection with the shelf supporting castings, it is pointed out that the method of suspending and positioning them is very advantageous in that it gives a stiffening effect to the floor. The set screws 44 which position the castings at the top by engagement in the counterbores or indents 46 in the floor plates act to transmit to the castings any stresses which tend to deflect the floor plates in the region of the set screws. The castings in turn transmit such stresses to the next adjacent plate where it becomes an upward push, and also to the tie angles 47 at the lower portion of the casting which carry the stresses to adjacent castings and to the end supports or column casing. In instances where bottom positioning such as illustrated in Figure 14 is employed, the stresses are transmitted through the set screws 75 to the floor plates. Thus, this arrangement provides a stiffening effect which braces portions of the floor which would otherwise be unbraced.

It will be seen from the foregoing that I have provided a library construction employing a floor comprised of a plurality of members or plates securely and accurately fastened in place and so constructed and reinforced as to constitute a strong self-contained floor adapted to be carried by the columns and to give firm lateral support and bracing to the columns. Because of the stiff and self-contained nature of the floor, it also serves to take twists and warpings out of the columns which normally are frequently present in the columns. Also since the shelf supporting parts are supported and positioned from the floor, accurate spacing thereof and fitting of the shelves is ensured because irregularities in the columns do not affect the spacing and positioning of these parts.

At the same time, the arrangement is one which makes the maximum area available for book storage. As contrasted with constructions usually employed, I secure about ten per cent more book supporting area because of the minimizing of the waste space at the columns and because I am enabled to use practically the full distance from floor to ceiling.

I claim:

1. In library construction, a plurality of columns regularly arranged on fixed centers in rows extending at right angles to one another; a self contained floor structure comprising a plurality of rectangular sheet metal plates each occupying the rectangular area cornered by four adjacent columns, flanges at two opposite edges of said plates, stretcher members extending between columns in the direction of the other two edges of said plates, means for securing said stretcher members to the columns, means for supporting said plates from the stretcher members, and means for securing said plates together at said flanges.

2. In library construction, a plurality of columns regularly arranged on fixed centers and in rows extending at right angles to one another, a self contained floor structure comprising a plurality of cooperating metal stretcher members and other metal plate members connected so that a given number will occupy a predetermined area and having portions providing openings for the columns on the same fixed centers as the columns, means for securing the stretcher members to the columns and means for securing said other plate members to the stretcher members, said assembled structure laterally supporting the columns and said stretcher plate members having reinforcement to secure the needed strength and stiffness.

3. In library construction, a plurality of columns regularly arranged on fixed centers and in rows extending at right angles to one another, and a floor structure comprising a set of metal members each of which extends between a pair of columns of a row, a set of uniform metal plate members bridging the space between pairs of said first set of members and extending from the center line of one crossing row of columns to the center line of the next crossing row, said second set of members having flanges at their edges which are at said center lines, means for securing the first set of members to the columns, means for supporting the members of the second set from the members of the first set, and means for securing the members of the second set together at their flanges.

4. In library construction, a plurality of columns regularly arranged on fixed centers and in rows extending at right angles to each other, a self-contained floor comprising sets of cooperat-

ing plate members of frame-like form constructed to assemble with openings for the columns on the same fixed centers as the columns, certain of said plates having hollow reinforcing members providing a conduit, means at said openings for laterally securing said self-contained floor to the columns, and variable filler means associated with said securing means.

5. In library construction, a plurality of columns regularly arranged on fixed centers and in rows extending at right angles to one another, and a floor structure comprising a set of uniform metal plates, each extending between a pair of adjacent columns of a row and having bifurcated ends to receive columns, and having ledges at the sides, and a second set of uniform metal plates, each occupying the space between four adjacent columns of two rows and resting on the ledges of plates of the first set, and means for securing the bifurcated ends to the columns.

6. In library construction, a plurality of columns regularly arranged on fixed centers and in rows extending at right angles to one another, and a floor structure comprising a set of uniform metal plates, each extending between a pair of adjacent columns of a row and having bifurcated ends to receive columns, and having ledges at the sides, and a second set of uniform metal plates, each occupying the space between four adjacent columns of two rows and resting on the ledges of plates of the first set, and means for securing the bifurcated ends to the columns and upright shelf supporting members, said first set of plates having means for positioning shelf supporting members.

7. In library construction, a plurality of columns regularly arranged on fixed centers and in rows extending at right angles to one another, and a floor structure comprising a set of uniform metal plates each of which extends between a pair of columns of a row and is flanged at its sides, a second set of uniform metal plates bridging the space between pairs of the first set of plates and extending from the center line of one row of columns to the center line of the next row, said second set of plates having their sides flanged, means for securing the first set of plates to the columns, means for supporting plates of the second set from plates of the first set, and upright casing members enclosing the columns, said first set of plates having means adjacent their upper and lower faces for positioning said casing members.

8. In library construction, a plurality of columns regularly arranged on fixed centers and in rows extending at right angles to one another, and a self-contained floor and shelf-supporting structure comprised of a plurality of floor parts in units of fixed predetermined size associated and attached together to provide a substantially continuous floor with openings on the same fixed centers, for the columns with clearance therewith, upright shelf-supporting parts adjacent the openings adapted to enclose the columns, means for positioning the last mentioned parts with respect to the floor parts on the same fixed centers whereby all of said parts will have uniform spacing with relation to each other irrespective of the irregularities and variations normally incident to the columns, and means for supporting the said structure from the columns.

9. In library construction, a plurality of columns regularly arranged on fixed centers and in rows extending at right angles to one another, stretcher members between pairs of columns of a row, and floor plates carried by the stretcher members, said members and plates being supported by the columns entirely by lateral support comprising welds securing them to the sides of the columns.

10. In library construction, a plurality of columns regularly arranged on fixed centers and in rows extending at right angles to one another, stretcher members between pairs of columns of a row having bifurcated ends embracing the columns with a clearance sufficient to fit columns of maximum tolerance and to allow for any distortion normally incident to the columns, and means for securing the bifurcated ends to the columns including filler members between said bifurcated ends and said columns equal to the clearance.

11. In library construction, a plurality of columns regularly arranged on fixed centers and in rows extending at right angles to one another, a sheet metal plate floor supported from and laterally supporting said columns, shelf-supporting members, means for suspending said members from the floor, means carried by said members at the upper portion thereof engaging the floor for positioning the members, and means at the lower portion of said members for positioning them, said shelf supporting members and said positioning means combined serving to give a stiffening effect to the floor.

12. In library construction, a plurality of columns regularly arranged on fixed centers and in rows extending at right angles to one another, a sheet metal plate floor supported from and laterally supporting said columns, shelf-supporting members, means centrally of the upper portion of said members for suspending them from the floor, means adjacent the upper corners of said members engaging the floor to position the members, and means at the lower portion of said members for further positioning them, the positioning means adjacent one upper corner of a member serving to transmit to the member stresses which tend to deflect the plate floor in the region thereof, and the member serving to transmit such stresses to the other upper corner and against the plate floor, and said lower positioning means also absorbing such stresses whereby a stiffening effect is given to the plate floor.

13. In library construction, a plurality of columns regularly arranged on fixed centers in rows extending at right angles to one another; a self-contained floor structure comprising a plurality of rectangular sheet metal plates each occupying the rectangular area cornered by four adjacent columns, and means for supporting said plates from the columns, vertically corrugated casings enclosing said columns and the said casings being positioned and supported from said floor structure; and shelf supporting means in the corrugations of said casings.

14. In library construction, a plurality of columns regularly arranged on fixed centers and in rows extending at right angles to one another, a self contained floor structure comprising a plurality of metal floor members so correlated that a given number will occupy a predetermined area with openings receiving the columns with clearance, certain of said metal floor members being edge flanged and others being substantially channel shaped in cross-section to secure the needed strength and stiffness, means for securing said floor members together, and variable means for vertically positioning said floor structure with respect to the columns.

15. In library construction, a plurality of columns regularly arranged on fixed centers and in rows extending at right angles to one another, a self contained floor structure comprising a plurality of metal floor members so correlated that a given number will occupy a predetermined area with openings receiving the columns with clearance, certain of said metal floor members being edge flanged and others being substantially channel shaped in cross-section to secure the needed strength and stiffness, said channel shaped floor members having means providing edge support for the other floor members, means for securing said floor members together, and variable means for vertically positioning said floor structure with respect to the columns.

16. In library construction, a plurality of columns regularly arranged on fixed centers and in rows extending at right angles to one another, a substantially continuous floor comprised of a plurality of sets of floor members, the members of each set being prefabricated counterparts of predetermined size, upright casings enclosing the columns, means on the members of one of said sets for positioning said upright column enclosing casings in spaced surrounding relation to the columns, and variable means for securing the floor to the columns.

17. In library construction, a plurality of columns regularly arranged on fixed centers and in rows extending at right angles to one another, and a self contained floor structure comprising cooperating metal members presenting floor surface of a predetermined area, certain of said members occupying the space between a pair of columns of a row and having end portions straddling said columns with clearance, and the remaining of said members occupying the space between said certain members, means securing said metal members together, and variable means for securing said assembled floor structure to the columns.

18. In library construction, a plurality of columns regularly arranged on fixed centers and in rows extending at right angles to one another, a substantially continuous floor comprised of a plurality of sets of floor members, the members of each set being prefabricated counterparts of predetermined size, certain of said members having edge flanges, shelf-supporting members, means for suspending said shelf-supporting members from said certain members at the flanges, means for positioning said shelf-supporting members at their upper and lower portions, said shelf-supporting members and said positioning means serving to give a stiffening effect to the floor.

19. In library construction, a plurality of columns regularly arranged on fixed centers and in rows extending at right angles to one another, a substantially continuous floor comprised of floor members in the form of stretchers each of which extends between two adjacent columns in the rows of columns arranged in one direction and having forked end portions the prongs of which are spaced so as to straddle the columns with clearance, variable means for securing said stretchers to the columns at said forked end portions, said stretchers when secured in place forming spaced strips of flooring, and floor members secured to said stretchers filling the space between said strips to complete the floor surface.

20. In library construction, a plurality of columns regularly arranged on fixed centers and in rows extending at right angles to one another, a substantially continuous floor comprised of floor members in the form of stretchers each of which extends between two adjacent columns in the rows of columns arranged in one direction and having forked end portions the prongs of which are spaced so as to straddle the columns with clearance, variable means for securing said stretchers to the columns at said forked end portions, said stretchers when secured in place forming spaced strips of flooring, and floor members secured to said stretchers filling the space between said strips to complete the floor surface, said stretchers having recessed edge portions to receive said last mentioned floor members in flush relation.

21. In library construction, a plurality of columns regularly arranged on fixed centers and in rows extending at right angles to one another, a substantially continuous floor comprised of floor members in the form of stretchers each of which extends between two adjacent columns in the rows of columns arranged in one direction and having forked end portions the prongs of which are spaced so as to straddle the columns with clearance, means for securing said stretchers to the columns at said forked end portions including filler members taking up said clearance, and other floor members secured to said stretchers to complete the floor surface.

22. In library construction, a plurality of columns regularly arranged on fixed centers, a self-contained metallic floor having a plurality of column receiving openings arranged on the same fixed centers as the columns, said openings being of a size to provide clearance space between the columns and the marginal edges of the openings, means at said openings for laterally securing the floor to the columns, and filler means between the sides of the columns and the adjacent marginal edges of the openings equal to the clearance space thereat.

23. In library construction, a plurality of columns regularly arranged on fixed centers, a self-contained metallic floor having a plurality of column receiving openings arranged on the same fixed centers as the columns, said openings being of a size to provide clearance space between the columns and the marginal edges of the openings, said metallic floor having flanged portions at opposite marginal edges of said openings, means for securing said flanged portions to the side faces of the columns, and filler means between said flanged portions and said side faces equal to the clearance space therebetween.

24. In library construction, a plurality of columns regularly arranged on fixed centers, a self-contained metallic floor having a plurality of column receiving openings arranged on the same fixed centers as the columns, said openings being of a size to provide clearance space between the columns and the marginal edges of the openings, means at said openings for laterally securing the floor to the columns, filler means between the sides of the columns and the adjacent marginal edges of the openings variable to equal the clearance space thereat, upright casings enclosing the columns, and upwardly and downwardly extending means carried by the floor marginally of said openings for positioning said casings on the same fixed centers as the openings in the floor.

25. In library construction, a plurality of columns regularly arranged on fixed centers, a self-contained metallic floor having a plurality of column receiving openings arranged on the

same fixed centers as the columns, said openings being of a size to provide clearance space between the columns and the marginal edges of the openings, means at said openings for laterally securing the floor to the columns, filler means between the sides of the columns and the adjacent marginal edges of the openings substantially equal to the clearance space thereat, shelf supports suspended from said floor, and means on said floor for positioning said shelf supports in fixed predetermined spaced relation.

26. In library construction, a plurality of columns regularly arranged on fixed centers, a self-contained metallic floor having a plurality of column receiving openings arranged on the same fixed centers as the columns, said openings being of a size to provide clearance space between the columns and the marginal edges of the openings, means at said openings for laterally securing the floor to the columns, filler means between the sides of the columns and the adjacent marginal edges of the openings substantially equal to the clearance space thereat, flange-like portions depending downwardly from said floor, and shelf supports suspended from said flange-like portions, said portions having means spaced a predetermined distance apart engageable by said shelf supports to position them in spaced relation.

27. In library construction, a plurality of columns regularly arranged on fixed centers, a self-contained metallic floor having a plurality of column receiving openings arranged on the same fixed centers as the columns, said openings being of a size to provide clearance space between the columns and the marginal edges of the openings, means at said openings for laterally securing the floor to the columns, filler means between the sides of the columns and the adjacent marginal edges of the openings variable to equal the clearance space thereat, upright casings enclosing the columns, means carried by the floor at said openings for positioning said casings on the same fixed centers as the openings in the floor, shelf supports suspended from said floor, said floor having means for positioning said shelf supports in fixed predetermined spaced relation, bracing means at the lower portions of said shelf supports extending from column to column, and means for securing said shelf supports to said bracing means.

28. In library construction, a plurality of columns regularly arranged on fixed centers, a self-contained metallic floor having a plurality of column receiving openings arranged on the same fixed centers as the columns, said openings being of a size to provide clearance space between the columns and the marginal edges of the openings, means at said openings for laterally securing the floor to the columns, filler means between the sides of the columns and the adjacent marginal edges of the openings variable to equal the clearance space thereat, upright casings enclosing the columns, means carried by the floor at said openings for positioning said casings on the same fixed centers as the openings in the floor, shelf supporting means associated with said casings, and other shelf supporting means suspended and positioned from said floor.

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