US 20110219721A1

(19) **United States**

(12) **Patent Application Publication**

Densmore

(10) **Pub. No.: US 2011/0219721 A1**

(43) **Pub. Date: Sep. 15, 2011**

(54) **MESH SPACER FOR REINFORCED CONCRETE**

(75) Inventor: **David S. Densmore**, Englewood, CO (US)

(73) Assignee: **ROCKY MOUNTAIN PRESTRESS, LLC**, Denver, CO (US)

(21) Appl. No.: **12/721,702**

(22) Filed: **Mar. 11, 2010**

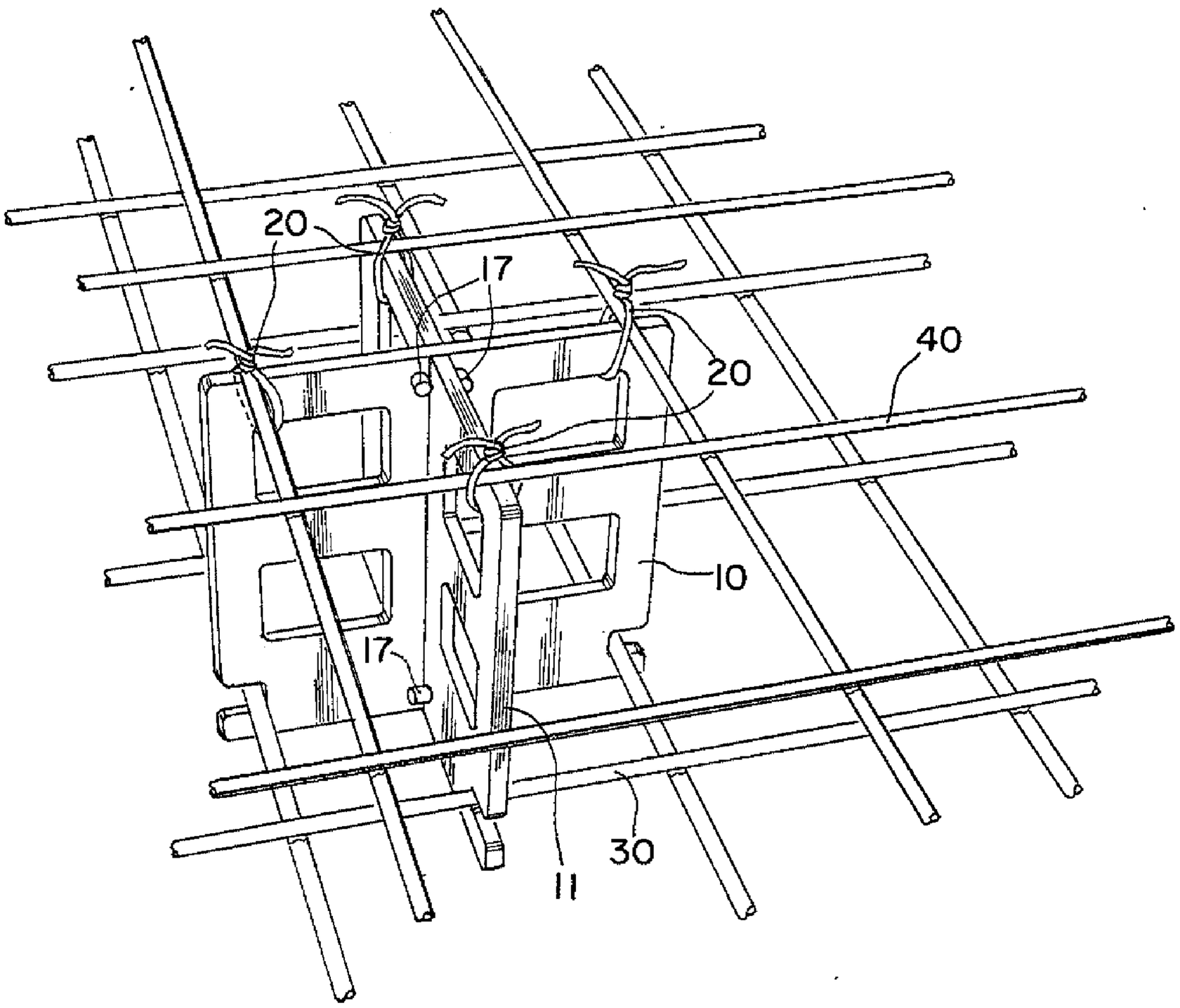
Publication Classification

(51) **Int. Cl.**
E04C 5/16 (2006.01)

(52) **U.S. Cl.** **52/687**; 52/677

(57) **ABSTRACT**

A mesh spacer has vertical members extending outward with an X-shaped cross-section and horizontal dimensions that allow insertion of the spacer into an opening in a lower layer of reinforcing mesh in a first orientation. Notches in the lateral edges of the vertical members engage the reinforcing strands of the lower layer of mesh in a second rotational orientation of the spacer. An upper layer of mesh can be placed on the top surfaces of the vertical members and secured with ties that pass through openings in the vertical members.



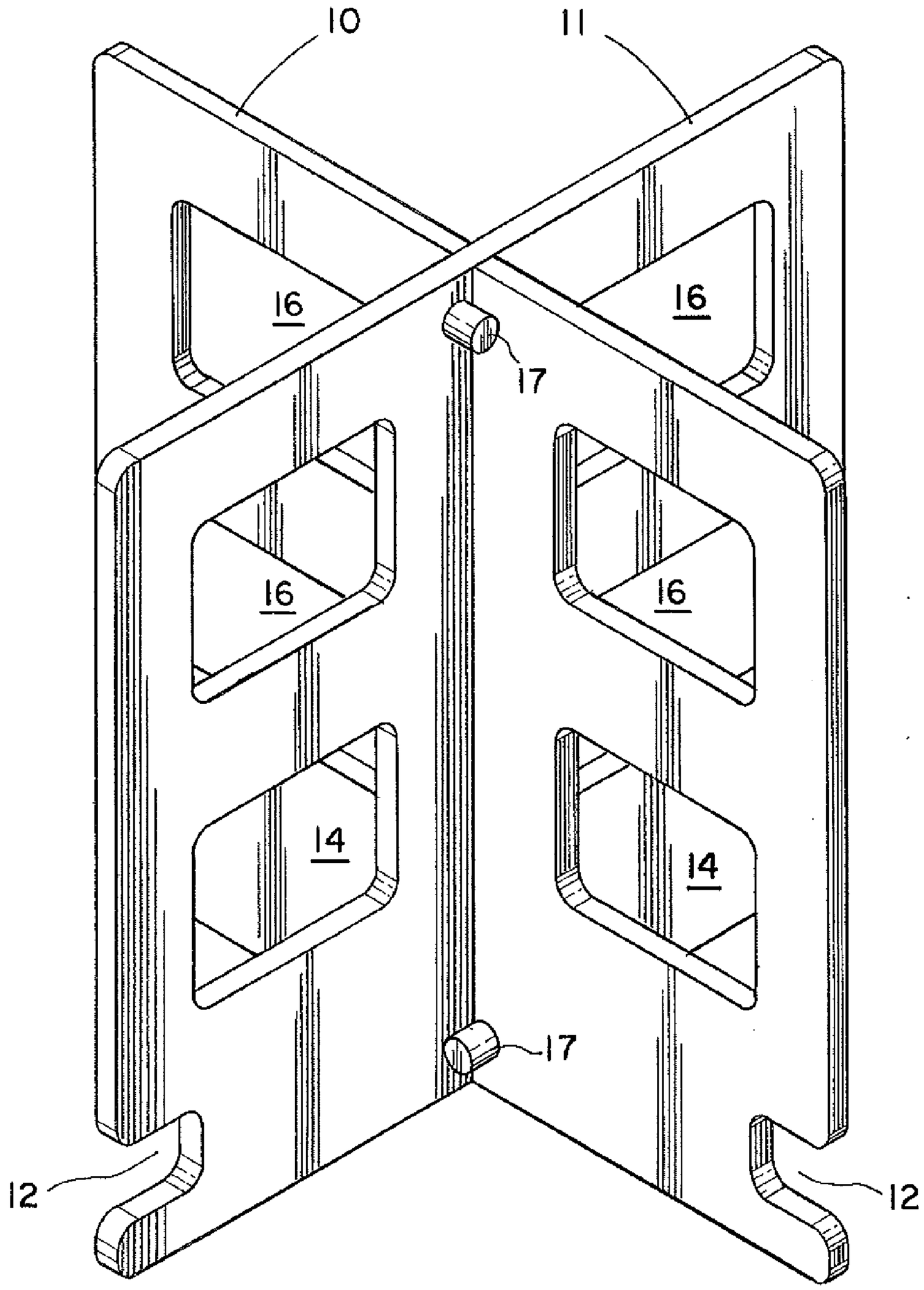


Fig. 1

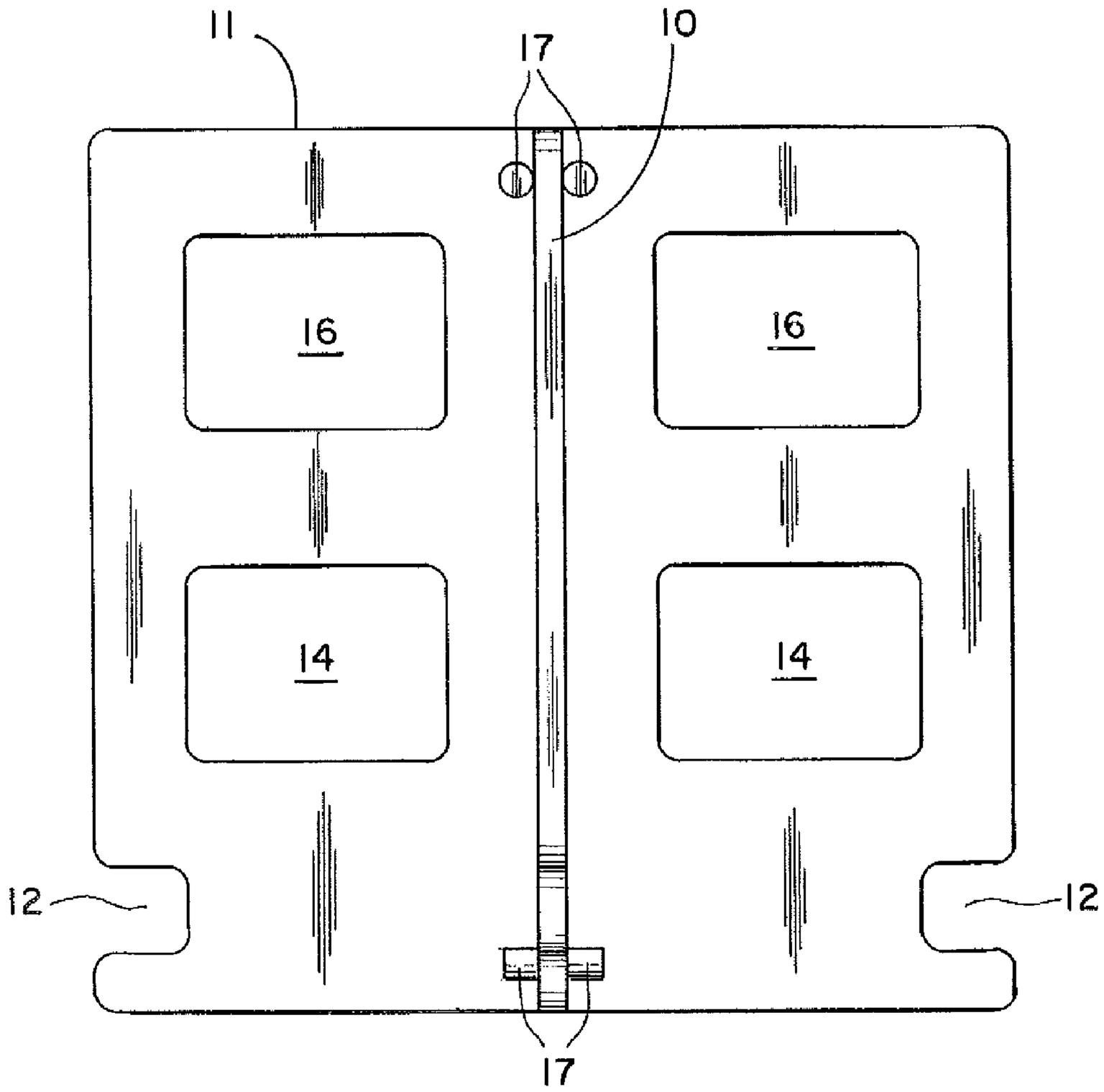


Fig. 2

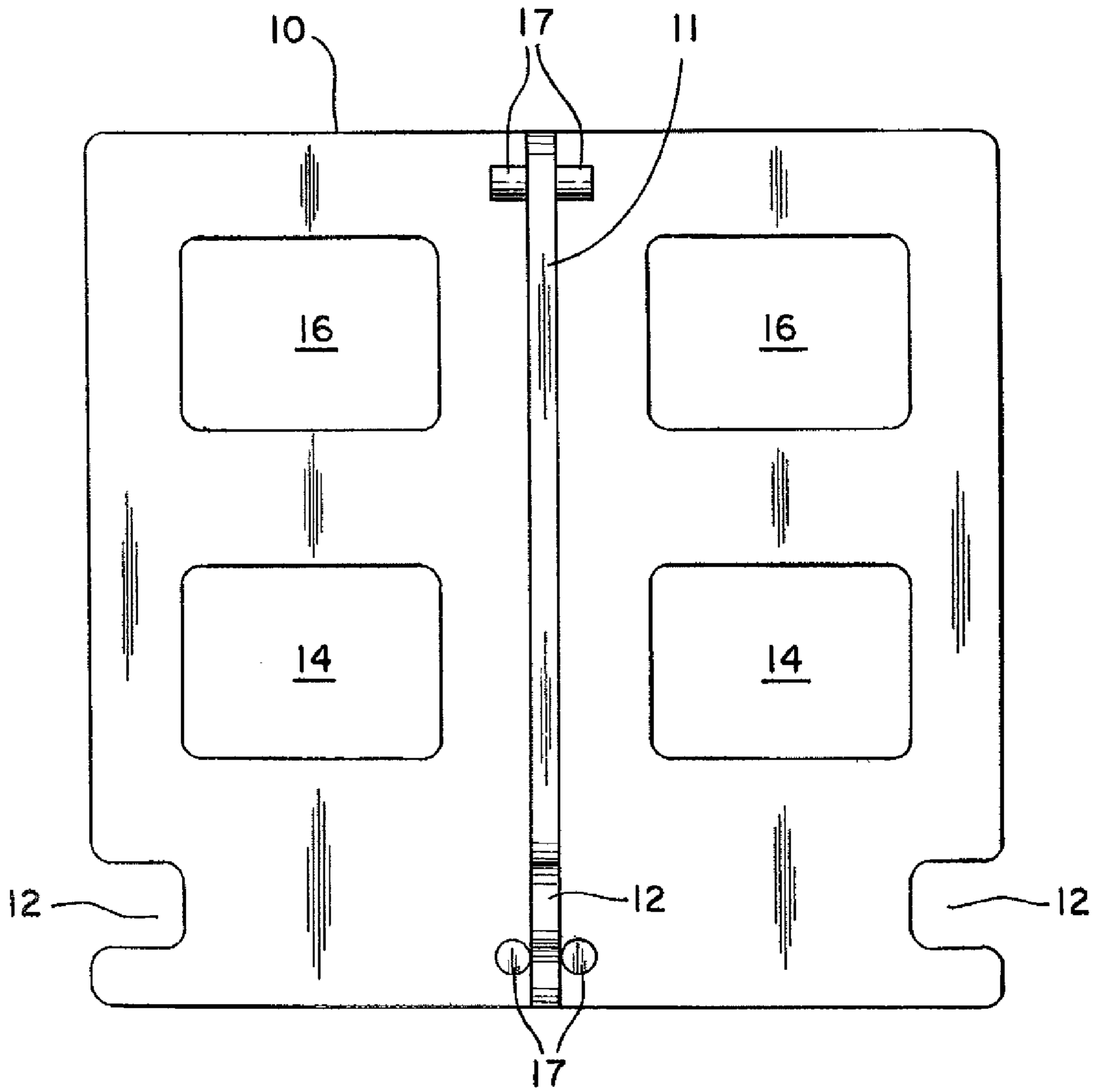


Fig. 3

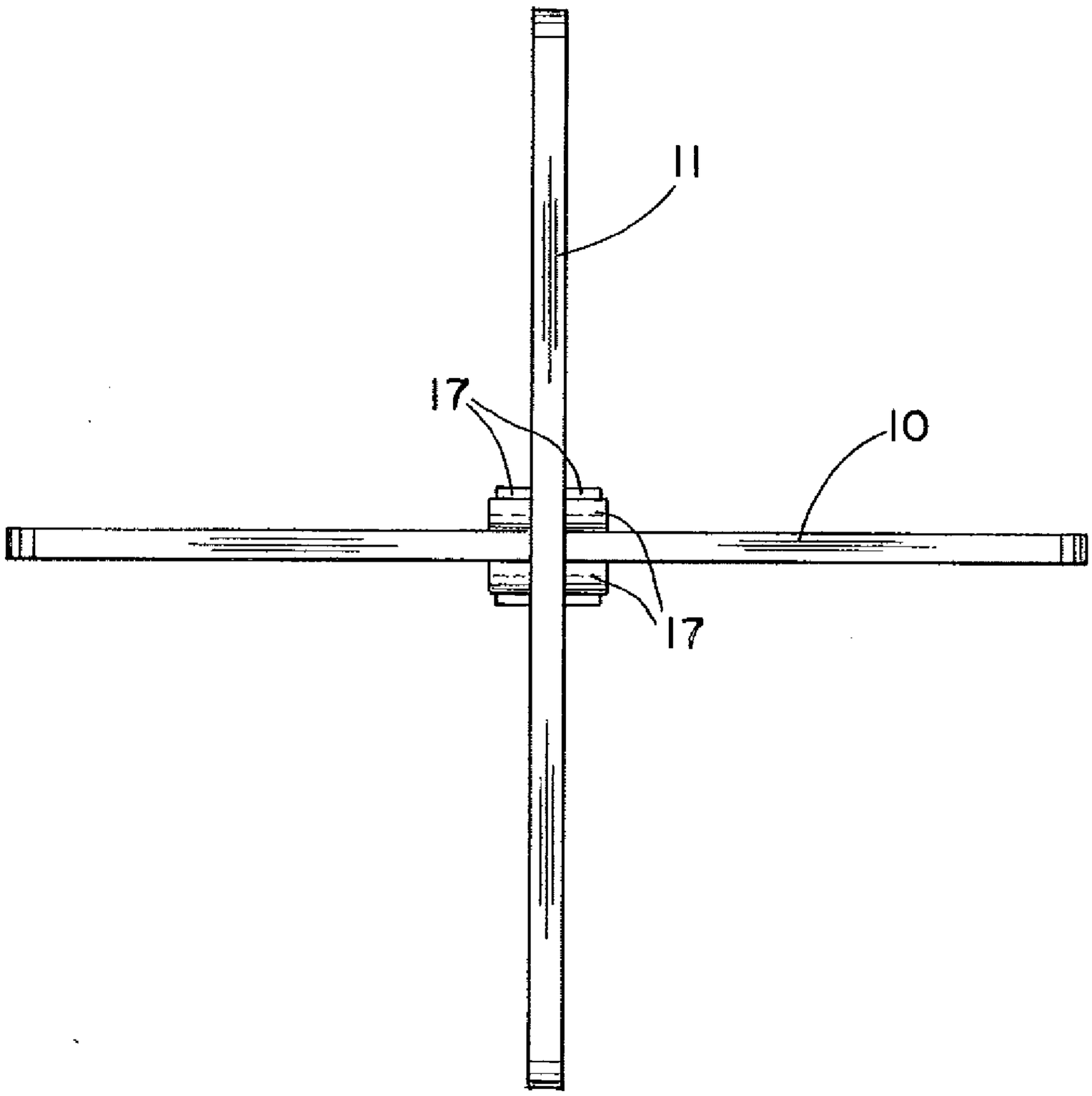


Fig. 4

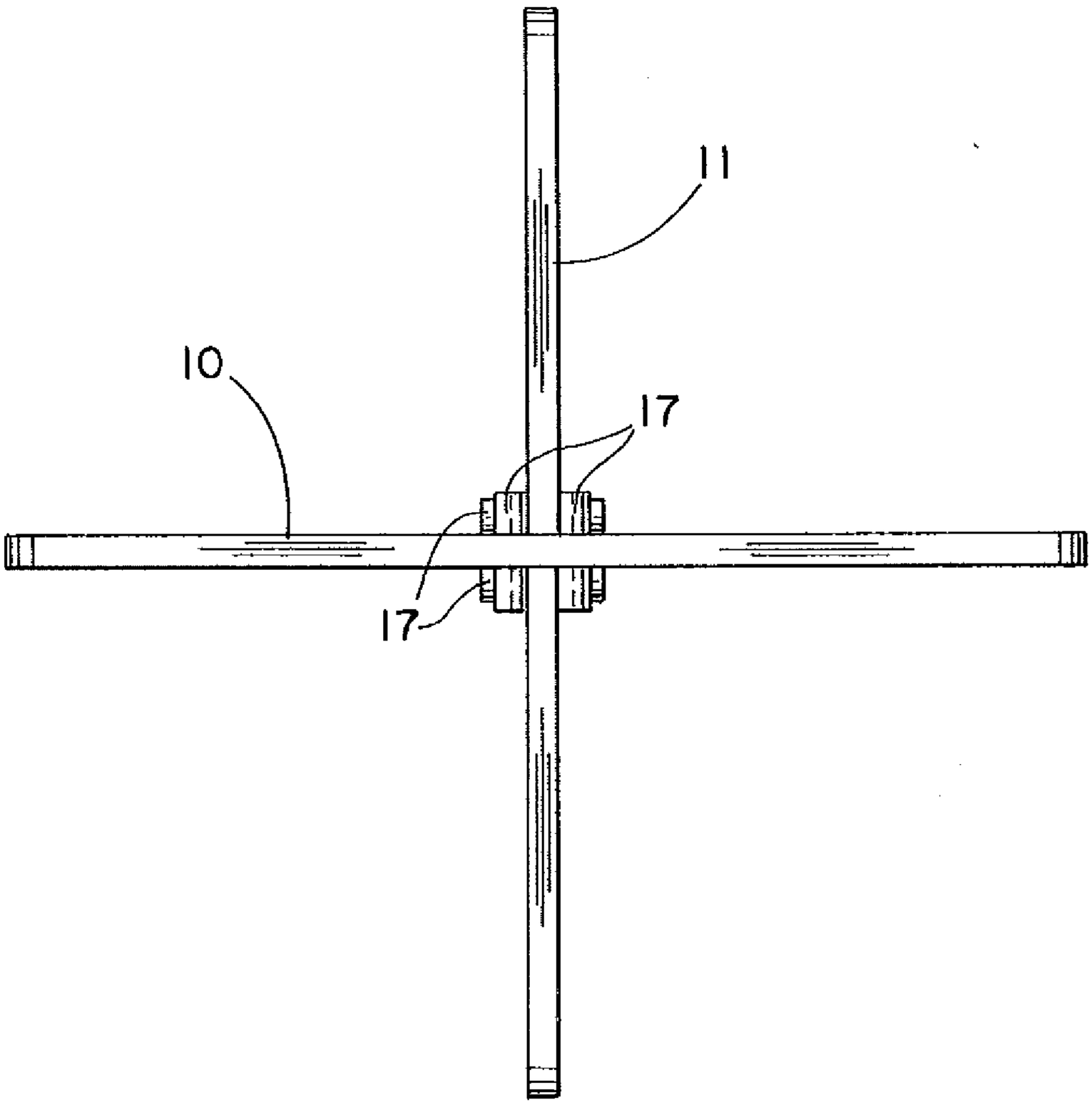


Fig. 5

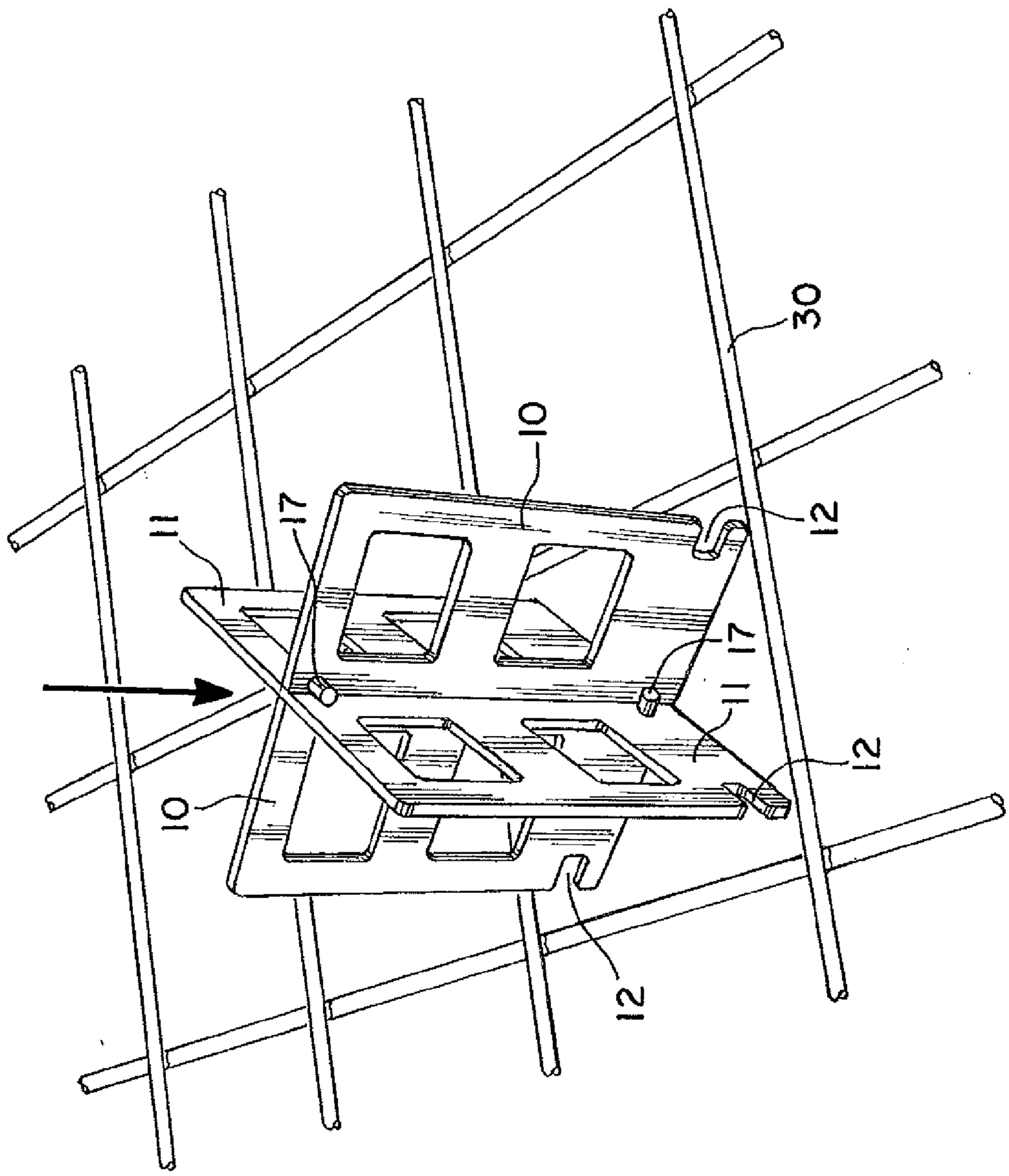


Fig. 6

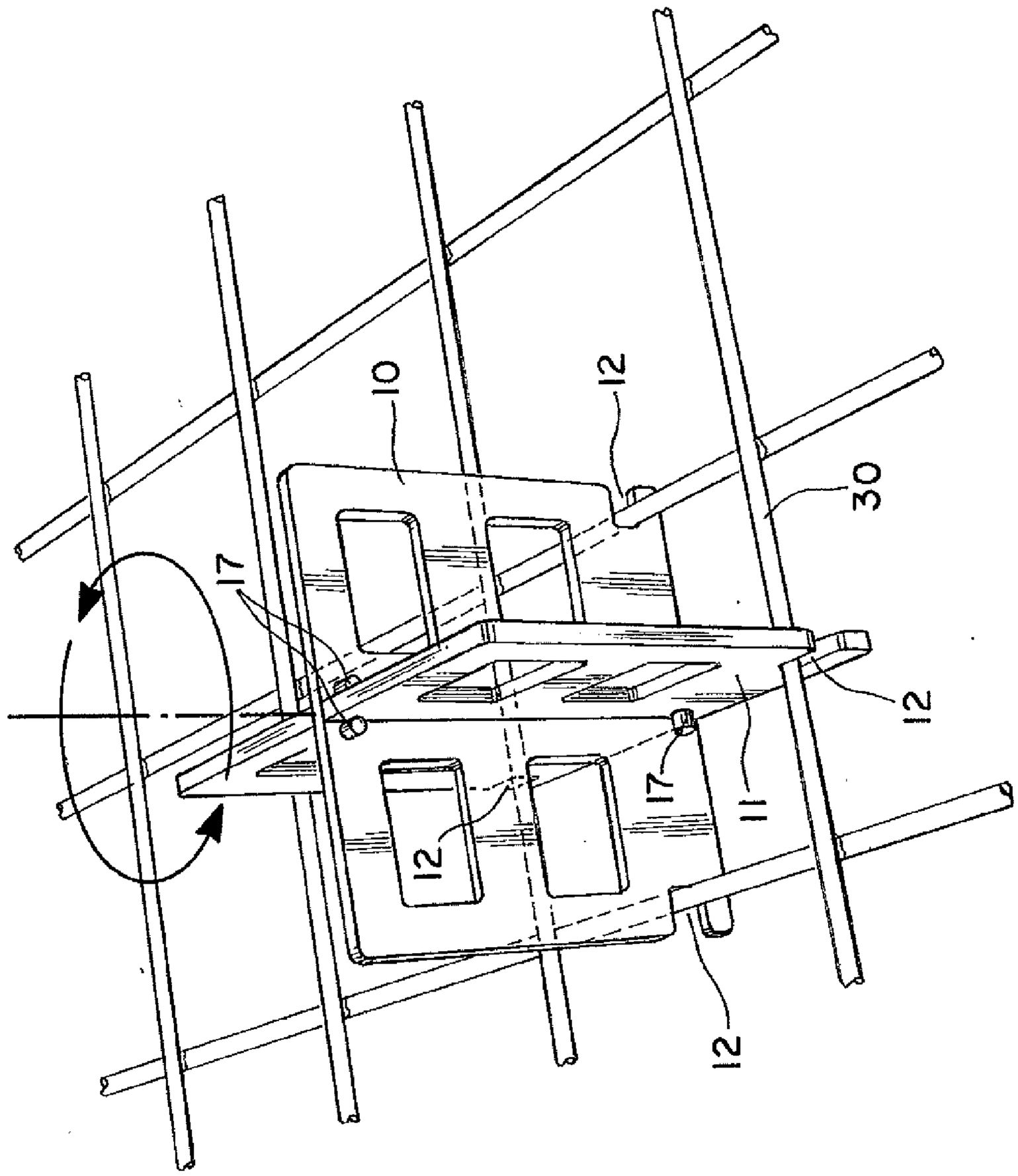


Fig. 7

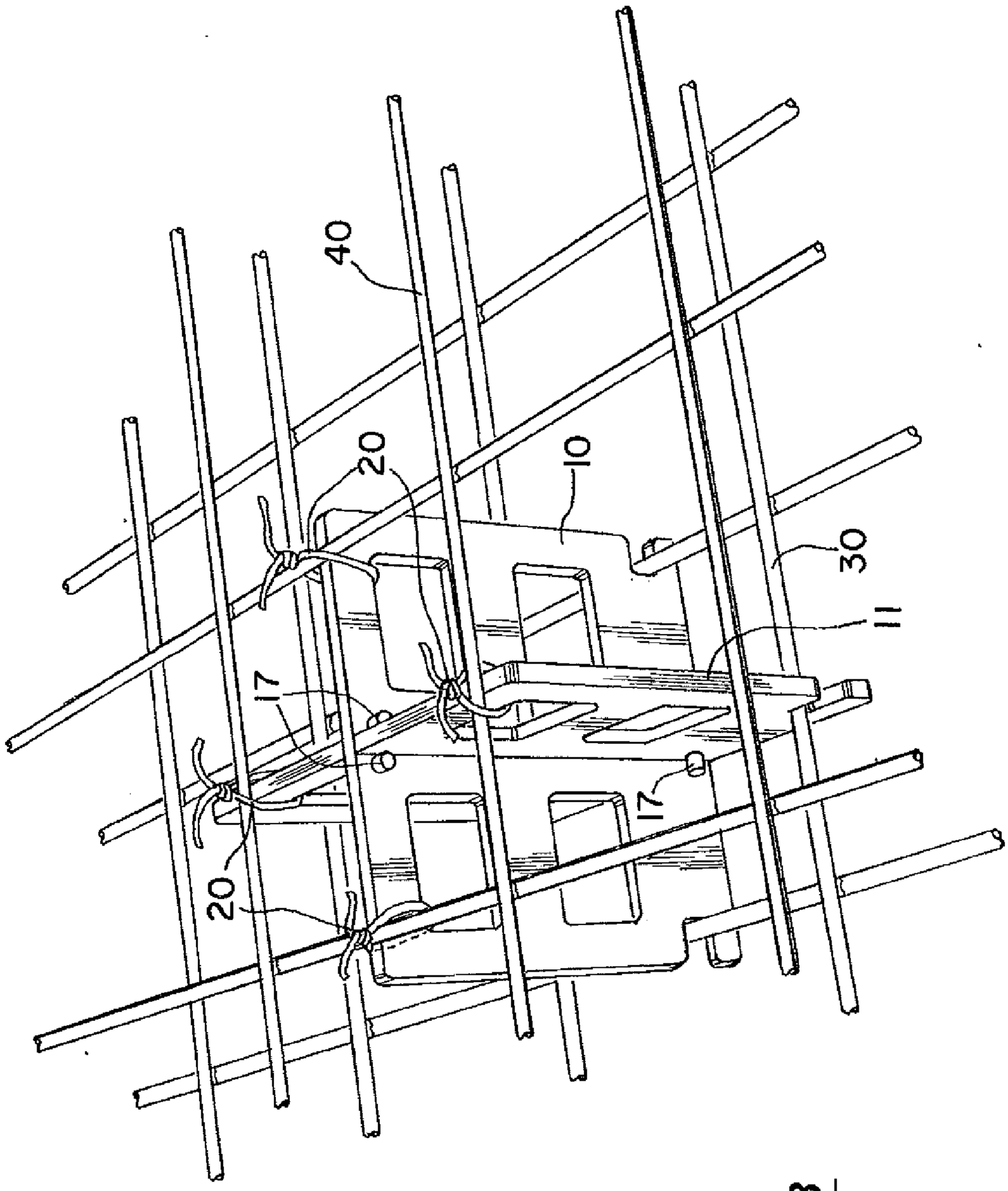


Fig. 8

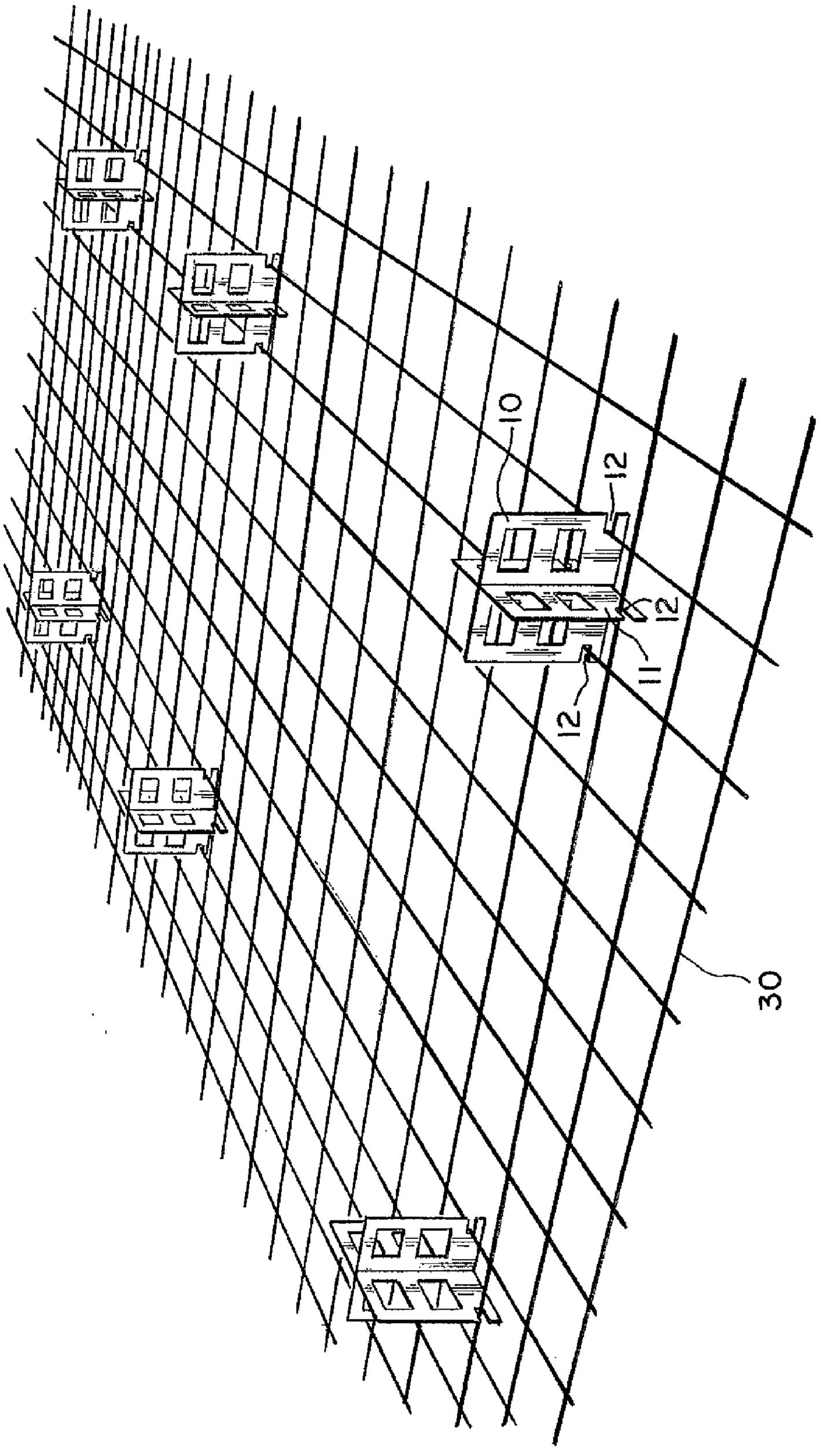


Fig. 9

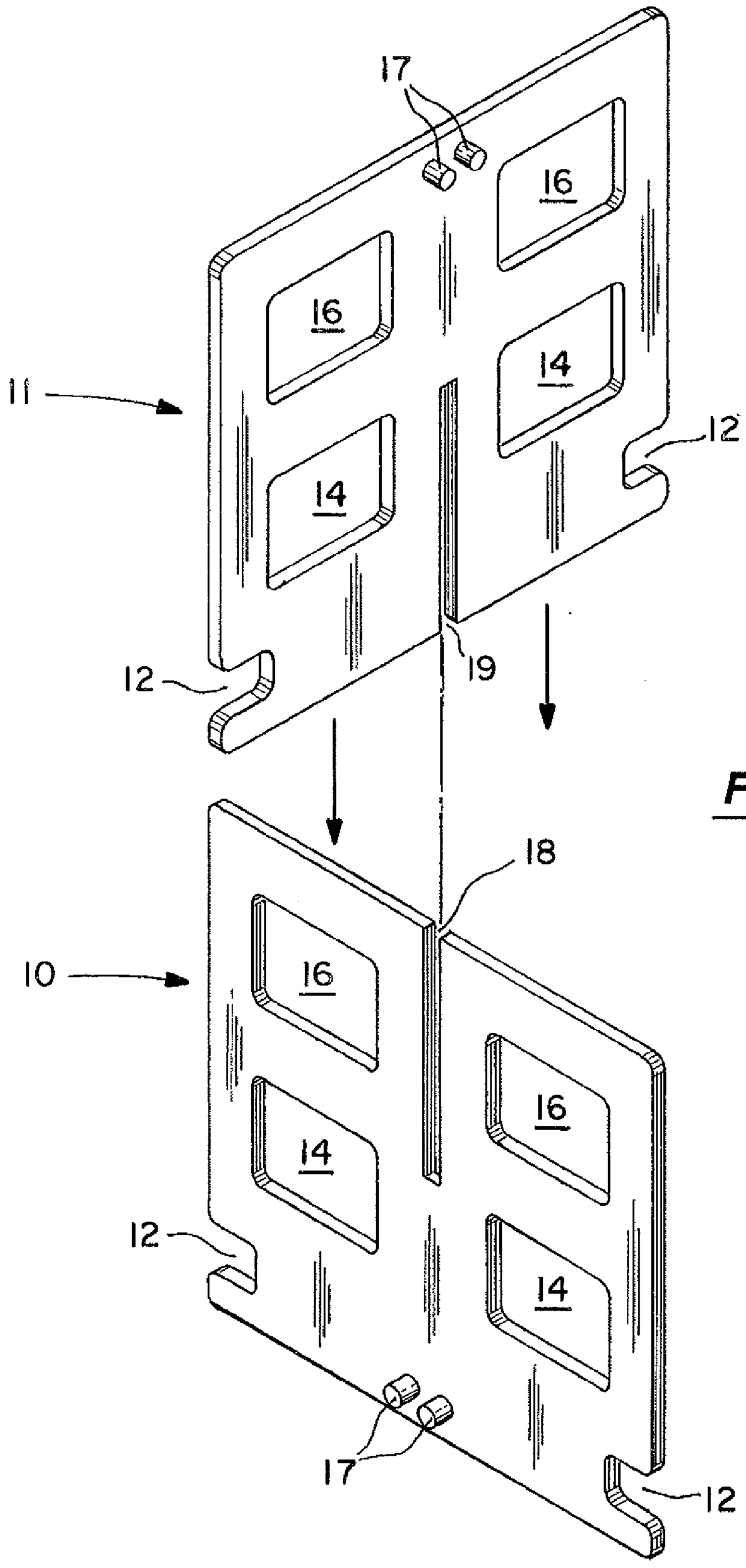


Fig. 10

MESH SPACER FOR REINFORCED CONCRETE

BACKGROUND OF THE INVENTION

[0001] 1. Field of the Invention

[0002] The present invention relates generally to the field of reinforced concrete. More specifically, the present invention discloses a spacer for positioning reinforcing mesh in concrete.

[0003] 2. Prior Art

[0004] Reinforcing mesh has long been used to enhance the structural properties of concrete. This mesh is typically a rectangular grid of steel reinforcing strands that is positioned in a concrete form and then becomes embedded in the concrete when the form is filed with wet concrete. A wide variety of spacers have been used in the past to hold the reinforcing mesh in a desired position within a form, so that the mesh will have the desired location and depth within the finished concrete slab or component.

[0005] A number of criteria must be considered in designing a suitable mesh spacer. Large numbers of mesh spacers are required for large construction projects, which dictates that manufacturing costs and installation costs at the job site are major factors. In particular, many conventional mesh spacers are made of steel and have very sharp edges that can injure workmen. Steel mesh spacers also rust, which can reduce the structural integrity of the concrete. The present invention addresses these requirements by providing a plastic mesh spacer that is simple and expensive to manufacture and install, and that minimizes the risk of injury to workers.

SUMMARY OF THE INVENTION

[0006] This invention provides a mesh spacer for reinforced concrete having vertical members that extend outward with an X-shaped cross-section. The horizontal dimensions of the spacer allow it to be inserted into an opening in a lower layer of reinforcing mesh in a first orientation (i.e., an orientation with the vertical members diagonal to the reinforcing strands of the mesh). Notches in the lateral edges of the vertical members engage the reinforcing strands of the lower layer of mesh in a second rotational orientation of the spacer (i.e., an orientation with the vertical members parallel to the reinforcing strands of the mesh). An upper layer of mesh can be placed on the top surfaces of the vertical members and secured with ties that pass through openings in the vertical members.

[0007] These and other advantages, features, and objects of the present invention will be more readily understood in view of the following detailed description and the drawings.

BRIEF DESCRIPTION OF THE DRAWINGS

[0008] The present invention can be more readily understood in conjunction with the accompanying drawings, in which:

[0009] FIG. **1** is a perspective view of the mesh spacer.

[0010] FIG. **2** is a front elevational view of the mesh spacer.

[0011] FIG. **3** is a side elevational view of the mesh spacer.

[0012] FIG. **4** is a top view of the mesh spacer.

[0013] FIG. **5** is a bottom view of the mesh spacer.

[0014] FIG. **6** is a perspective view showing a mesh spacer being placed into an opening in a layer of reinforcing mesh **30**.

[0015] FIG. **7** is a perspective view corresponding to FIG. **6** showing the mesh spacer after it has been rotated so that its notches **12** engage the mesh **30**.

[0016] FIG. **8** is a perspective view corresponding to FIGS. **6** and **7** showing a second layer of reinforcing mesh **40** placed on top of the mesh spacer and secured with wire ties **20**.

[0017] FIG. **9** is a perspective view showing an array of mesh spacers supporting a layer of reinforcing mesh **30**.

[0018] FIG. **10** is an exploded perspective view showing assembly of the vertical members **10** and **11** of a mesh spacer.

DETAILED DESCRIPTION OF THE INVENTION

[0019] Turning to FIG. **1**, a perspective view is shown of a mesh spacer embodying the present invention. FIGS. **2** and **3** are corresponding front and side elevational views of the mesh spacer. FIGS. **4** and **5** provide top and bottom views, respectively. This embodiment of the mesh spacer has two substantially planar, vertical members **10** and **11** that intersect each in other. Preferably, the vertical members are substantially orthogonal and have an X-shaped cross-section in the horizontal plane, as shown in FIGS. **1**, **4** and **5**.

[0020] The mesh spacer has bottom surfaces that serve as the feet to support the spacer in a concrete form. It also has top surfaces for supporting an upper layer of reinforcing mesh **40**, as will be discussed below. A number of windows or openings **14**, **16** extend through the vertical members of the mesh spacer. These openings **14**, **16** allow concrete and aggregate to flow around and through the mesh spacer, thereby reducing the chance of voids and creating a mechanical bond between the mesh spacer and the concrete.

[0021] The lateral edges of the vertical members **10**, **11** each include at least one notch **12** at a uniform vertical distance from the bottom of the mesh spacer. These notches **12** should be sufficiently large to effectively engage the reinforcing mesh grid, as will be described below. In addition, the overall dimensions of the mesh spacer in a horizontal plane must be carefully selected based on the corresponding dimensions of the reinforcing mesh. As previously mentioned, conventional reinforcing mesh **30** is typically made of an orthogonal grid of metal reinforcing strands that define an array of rectangular openings having standard dimensions. The horizontal cross-sectional dimensions of the mesh spacer must be sufficiently small to allow the mesh spacer to be inserted into the openings in the reinforcing mesh **30** when turned in the diagonal orientation shown in FIG. **6**. However, the horizontal cross-sectional dimensions of the mesh spacer must be sufficiently large to cause the notches **12** to engage the mesh **30** when the mesh spacer is rotated into the orientation shown in FIG. **7**. In particular, the overall length of the vertical members must be slightly longer than the corresponding dimensions of the mesh grid, so that the notches **12** can engage the reinforcing mesh **30** in this second rotational orientation.

[0022] In use, each mesh spacer is initially inserted into an opening in a layer of reinforcing mesh **30** as shown in FIG. **6**. The mesh spacer is inserted along an axis normal to the plane of the mesh (e.g., vertically, if the mesh is horizontal). The dimensions of the mesh spacer allow it to fit through the openings in the mesh **30** when the mesh spacer is held in an rotational orientation about the normal (vertical) axis so that the vertical members **10**, **11** of the mesh spacer are substantially non-parallel to the mesh grid. Optimally, the vertical members **10**, **11** are oriented diagonally (e.g., in a roughly 45

degree orientation) with respect to the grid of the mesh **30** in this first rotational orientation.

[0023] After the mesh spacer has been inserted to an elevation at which its notches **12** align with the mesh **30**, the mesh spacer is rotated about the normal axis as shown in FIG. **7**, so that the notches **12** of the mesh spacer engage the mesh **30**. This normally entails a rotation of about a quarter turn (i.e., about 45 degrees), so that the vertical members **10**, **11** are generally parallel with the grid of the mesh **30** in this second rotational orientation. The bottom surfaces of the vertical members **10**, **11** of the mesh spacer contact the floor of the concrete form. The portions of the vertical members **10**, **11** of the mesh spacer below the notches **12** support and elevate the mesh **30** a predetermined distance above the floor of the concrete form. The height of these portions of the vertical members **10**, **11** below the notches **12** determines the depth at which the reinforcing mesh **30** will be in the finished concrete slab.

[0024] A second, upper layer of reinforcing mesh **40** can then be placed atop the mesh spacers and secured with a number of ties **20**, as shown in FIG. **8**. The second layer of mesh **40** rests against the top surfaces of the mesh spacer. The ties **20** pass through the upper openings **16** in the mesh spacer and are secured around the upper layer of mesh **40**. The separation distance between the layers of mesh **30** and **40** is determined by the vertical spacing between the notches **12** and the upper surfaces of the mesh spacer.

[0025] An array of mesh spacers may be used to support a large pieces of reinforcing mesh **30** as illustrated in FIG. **9**. A three-foot spacing between mesh spacers is sufficient to allow a large man to walk on the mesh after final assembly.

[0026] It should be noted that the mesh spacer can be easily removed and relocated, if needed. It can be readily detached from the upper layer of reinforcing mesh **40** by cutting or untwisting the ties **20**. The mesh spacer can also be readily detached from the lower layer of reinforcing mesh **30** by rotating the mesh spacer a quarter turn to a diagonal orientation and then lifting it out of the opening in the mesh **30**.

[0027] After assembly of the mesh spacers and reinforcing mesh, concrete can then be poured into the form to cover the mesh spacers and both layers of reinforcing mesh **30**, **40**. The openings **14**, **16** in the mesh spacer allow concrete to freely flow through the mesh spacer so that it becomes an integral part of the finished concrete slab. The mesh spacers remain embedded in the concrete slab along with the reinforcing mesh **30**, **40** as the concrete cures. It should be noted that the mesh spacers can be stacked in a variety of configurations, if additional layers of reinforcing mesh are required for a particular job.

[0028] The mesh spacer can be made of any suitable material, including plastic, metal, or composite materials. In the preferred embodiment, the mesh spacer is made of polypropylene. This material is light weight, relatively inexpensive, dimensionally consistent, doesn't rust, and has no sharp edges that might injure workers.

[0029] The mesh spacer can be formed as a single piece or assembled from two or more planar pieces. In the preferred embodiment shown in the figures, the vertical members are mold for plastic as two separate pieces. Complementary slots **18**, **19** in both pieces enable the vertical members **10**, **11** to slide together in an orthogonal arrangement as depicted in FIG. **10** (i.e., to create an assembly having a substantially X-shaped cross-section in the horizontal plane). The slots **18**, **19** narrow with a slight taper (e.g., about 5 degrees) to hold the vertical members **10**, **11** together, and can also be equipped with locking features to create a snap fit. Small pegs **17** help to maintain proper alignment and positioning of the vertical members **10**, **11** after assembly.

[0030] It should be understood that alternative shapes and configurations of the mesh spacer and the vertical members could be readily substituted. For example, the vertical members are not necessarily planar or orthogonal. The number of vertical members could also be changed. More than one notch **12** could be provided on each lateral edge of the vertical members to accommodate a variety of elevations for the lower reinforcing mesh, or allow a plurality of lower mesh layers. The structural rigidity of the mesh spacer could be enhanced by including a central body or shaft with vertical members extending radially outward.

[0031] The above disclosure sets forth a number of embodiments of the present invention described in detail with respect to the accompanying drawings. Those skilled in this art will appreciate that various changes, modifications, other structural arrangements, and other embodiments could be practiced under the teachings of the present invention without departing from the scope of this invention as set forth in the following claims.

I claim:

1. A spacer for positioning a layer of reinforcing mesh in concrete, wherein said reinforcing mesh has a grid of reinforcing strands defining an array of openings through the mesh, said spacer comprising:

outwardly extending vertical members having bottom surfaces, top surfaces and lateral edges; said vertical members having horizontal dimensions allowing vertical insertion of the spacer into an opening in a layer of reinforcing mesh in a first rotational orientation; and

notches in the lateral edges of the vertical members for engaging the reinforcing strands of the layer of reinforcing mesh in a second rotational orientation of the spacer.

2. The spacer of claim **1** wherein the vertical members are not parallel to the reinforcing strands of the layer of reinforcing mesh in the first rotational orientation.

3. The spacer of claim **1** wherein the vertical members are substantially parallel to the reinforcing strands of the layer of reinforcing mesh in the second rotational orientation.

4. The spacer of claim **1** wherein the vertical members are orthogonal.

5. The spacer of claim **1** further comprising openings in the vertical members for engaging ties to secure an upper layer of reinforcing mesh support on the top surfaces of the vertical members.

6. The spacer of claim **1** wherein the vertical members further comprise complementary slots to assemble a spacer having an X-shaped cross-section.

7. The spacer of claim **1** wherein the vertical members are substantially planar.

8. A spacer for positioning an upper layer and a lower layer of reinforcing mesh in concrete, wherein said reinforcing mesh has a grid of reinforcing strands defining an array of openings through the mesh, said spacer comprising:

vertical members extending outward with a substantially X-shaped cross-section in a horizontal plane; said vertical members having bottom surfaces, top surfaces and lateral edges, and further having horizontal dimensions allowing vertical insertion of the spacer into an opening in a lower layer of reinforcing mesh in a first rotational orientation;

notches in the lateral edges of the vertical members for engaging the reinforcing strands of the lower layer of reinforcing mesh in a second rotational orientation of the spacer; and

openings in the vertical members for engaging ties to secure an upper layer of reinforcing mesh supported on the top surfaces of the vertical members.

9. The spacer of claim **8** wherein the vertical members are orthogonal.

10. The spacer of claim **8** wherein the vertical members are not parallel to the reinforcing strands of the layer of reinforcing mesh in the first rotational orientation.

11. The spacer of claim **8** wherein the vertical members are parallel to the reinforcing strands of the layer of reinforcing mesh in the second rotational orientation.

12. The spacer of claim **8** wherein the vertical members further comprise complementary slots for sliding engagement between the vertical members.

13. The spacer of claim **8** wherein the vertical members are substantially planar.

14. A spacer for positioning an upper layer and a lower layer of reinforcing mesh in concrete, wherein said reinforcing mesh has a rectangular grid of reinforcing strands defining an array of rectangular openings through the mesh, said spacer comprising:

two vertical members intersecting orthogonally to form a substantially X-shaped cross-section in a horizontal plane; said vertical members having bottom surfaces, top surfaces and lateral edges, and further having horizontal dimensions allowing vertical insertion of the spacer into an opening in a lower layer of reinforcing mesh in a first rotational orientation in which the vertical members are not parallel to the reinforcing strands of the reinforcing mesh;

notches in the lateral edges of the vertical members for engaging the reinforcing strands of the lower layer of reinforcing mesh in a second rotational orientation of the spacer in which the vertical members are substantially parallel to the reinforcing strands of the reinforcing mesh; and

openings in the vertical members for engaging ties to secure an upper layer of reinforcing mesh support on the top surfaces of the vertical members.

15. The spacer of claim **14** wherein the vertical members further comprise complementary slots for sliding engagement between the vertical members.

16. The spacer of claim **14** wherein the vertical members are substantially planar.

* * * * *