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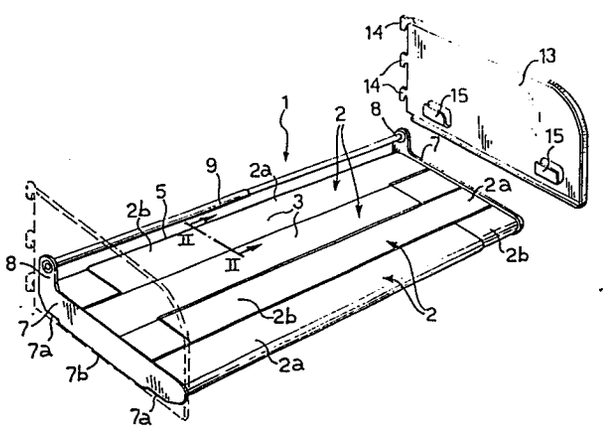
## (54) Shelving with extendible shelves, particularly for use as bookshelves.

(57) A shelving, particularly for use as bookshelves, comprises a support structure (16; 19, 20; 27; 34) and a series of horizontal shelves (1) carried by the support structure. Each horizontal shelf (1) comprises a series of flat telescopic elements located side by side, so that it can assume any length between a minimum length and a maximum length.




EP 0 215 751 A2

Shelving with extendible shelves, particularly for use as bookshelves.

The present invention relates to shelving, particularly for use as bookshelves, of the type comprising a support structure and a series of horizontal shelves carried by the support structure.

The object of the invention is to provide shelving of the type specified above which has a simple structure that is easy and quick to assemble and convenient to transport, and which at the same time is able to take up various configurations so as to satisfy the different possible requirements of the user.

The main characteristic of the shelving according to the invention lies in the fact that each horizontal shelf includes a series of flat telescopic elements located side by side, so that it can take up any length between a minimum length and a maximum length.

Each telescopic element is constituted by two profiled elements slidable one within the other and fixed respectively at their two opposite ends to two end plates for attachment of the shelf to the support structure. The two end plates are connected together by an auxiliary telescopic member which is preferably located adjacent the longitudinal edge of the shelf in a position spaced slightly above it. This auxiliary telescopic member has travel limit means for limiting the maximum length of the shelf.

The shelving also has a series of book-end brackets each constituted by an elongate element bent into a closed profile and provided at its two adjacent ends with appendages for engaging the auxiliary telescopic

member from opposite sides by resilient deformation of the element constituting the bracket , so as to clamp the latter on the auxiliary telescopic member.

The present invention will now be described with reference to the appended drawings, provided purely by way of non-limiting example, in which:

Figure 1 is a perspective view of a shelf of the shelving according to the invention,

Figure 2 is a section taken on the line II of Figure 1,

Figure 3 is a section taken on the line III of Figure 1,

Figure 4 is an exploded perspective view of a first embodiment of the shelving of the invention,

Figure 5 is a perspective view of a detail of the shelving,

Figure 6 is a perspective view of a second embodiment of the shelving of the invention,

Figure 7 is a perspective view of a third embodiment of the shelving according to the invention,

Figure 8 is a partially sectioned perspective view of a detail of Figure 7,

Figure 9 is an exploded perspective view of a fourth embodiment of the shelving according to the invention,

Figure 10 is a plan view of a detail of Figure 9,

Figure 11 is a partial plan view of a fifth embodiment,

Figure 12 is a perspective view of a sixth embodiment of the shelving according to the invention, and

Figure 13 is a sectional view taken on the line XII of Figure 1.

With reference to Figure 1, one shelf of the shelving according to the invention is generally indicated 1. The shelf 1 comprises a series of substantially flat telescopic elements 2 located side by side, so that it can take up any length between a minimum length and a maximum length. Each telescopic element 2 is constituted by two profiled elements 2a, 2b slidable one within the other (see also Figure 2). In the embodiment illustrated, the profiled elements are made of sheet metal and have a substantially C-section defined by a central wall, indicated 3 and 4 respectively, and two pairs of longitudinal side walls, indicated 5 and 6 respectively, bent towards each other. The walls 5 which define the two opposite longitudinal edges of the shelf 1 have rounded profiles. The opposite ends of the telescopic elements 2 are fixed to two end plates 7 which, in the example illustrated, have a profile corresponding substantially to the profile of the shelf and projecting slightly outwardly thereof. Moreover, the two end plates 7 each include a lug 8 located adjacent one end of the plate 7. The two lugs 8 are fixed, for example by screws, to the two ends of an auxiliary telescopic member 9 which, in the example illustrated, is constituted by two circular-sectioned tubular members slidable one within the other. The auxiliary telescopic member 9, which is disposed adjacent a longitudinal edge of the shelf 1 in

a position slightly spaced from and above the latter, fulfils various functions. It constitutes a stop for the books or other objects which are to be placed on the shelf 1; it is also used for the anchorage of book-end brackets, as will be explained in detail below. The auxiliary telescopic member 9 also includes travel limit means for limiting the position of maximum extension of the member 9. This avoids the risk of the elements 2b sliding out of the elements 2a constituting the shelf. The travel limit means may be of any known type and consequently have not been illustrated in the drawings to make these easier to understand.

The shelf 11 may also be provided with locking means of any known type for locking the shelf in the configuration corresponding to a desired length. These locking means are also not illustrated in order to simplify the drawings as much as possible.

All the various embodiments of the shelving according to the invention have book-end brackets 10 each made in the manner illustrated by way of example in Figure 5. Each of these brackets is constituted by an elongate element 11 which, in the example shown in Figure 5, is a circular-sectioned metal element bent into a closed profile and having two appendages 12 at its two adjacent ends, for example, in the form of circular channel sections, for engaging the opposite sides of the auxiliary telescopic member 9 by resilient deformation of the element 11, so as to allow the bracket 10 to be clamped onto the member 9 in the manner illustrated, for example, in Figures 4, 6, 7, 9 and 11.

In the embodiment of Figures 4, 6 and 7, the support

structure for the shelves of the shelving includes a wall-mountable frame, and a plurality of brackets 13, one of which is also visible in Figure 1. Each bracket 13 has teeth 14 for connection to the wall-mountable frame, as will be explained in detail below, so as to enable it to be supported in cantilever manner by this frame. Furthermore, each bracket 13 has hook means for its connection to a corresponding end plate 7 of a corresponding shelf 1. In the embodiment illustrated, the hook means are constituted by two hook appendages 15 (see also Figure 3) blanked and bent from the plate constituting the bracket 13, which in the embodiment illustrated is of sheet metal. Each end plate 7 has a lower edge which projects slightly downwardly from the lower profile of the shelf 2. This edge includes two end portions 7a which are received and supported within seats defined by the hook appendages 15, and a central portion 7b projecting downwardly from the end portions 7a and engageable between the two appendages 15 so as to prevent movement of the shelf 1 relative to the bracket 13 in a direction transverse the longitudinal axis of the shelf.

In the embodiment illustrated in Figure 4, the wall-mountable frame to which the brackets 13 are fixed in their turn is constituted by a plurality of uprights 16 which can be fixed to a wall by screw plugs and have series of slots 16a one above another for receiving the teeth 14 of each bracket 13 so as to support the bracket in cantilever fashion.

Figure 4 also shows the book-end brackets 10 which can be formed with different profiles, as shown in this Figure.

The embodiment of Figure 6 differs from that of Figure 4 mainly in that the uprights 16 are connected together in pairs by articulated X-shaped elements each constituted by a pair of rods 17 articulated together at their centres and having ends 18 slidably guided within the corresponding uprights. In the particular embodiment illustrated in Figure 6, the wall-mountable frame also includes a further upright 16 in correspondence with the articulation of each X-shaped element. The X—shaped elements interconnecting the uprights 16 ensure that these uprights are parallel and thus facilitate the fixing of the support frame to a wall in the correct position. The presence of the uprights 16 in correspondence with the joints of the X-shaped elements also enables the shelves 1 to be mounted in horizontally staggered positions, as is clear from the drawing.

In the embodiment of Figure 7, the wall-mountable frame which supports the brackets 13 is shaped in the form of gymnastic wall bars.

More particularly this frame is constituted by two structures 19, 20 each constituted by a respective pair of uprights 19a, 19b and 20a, 20b joined together by a plurality of vertically spaced cross members 21, 22. The uprights 19b, 20b which are furthest from each other are connected rigidly to the cross members 21, 22 of the respective structures 19, 20, while the uprights 19a, 20a which are located between the two uprights of the other structure are each connected rigidly to the respective cross members 21, 22 and at the same time have apertures 23 (see Figure 8) within which the cross members of the other structure are slidably guided. In the particular embodiment illustrated, both the

uprights 19a, 19b, 20a, 20b and the cross members 21, 22 are constituted by channel-sectioned elements. Moreover, the cross members 21 of the structure 19 are intercalated vertically between the cross members 22 of the structure 20.

By virtue of the arrangement described above, the two structures 19, 20 are slidable relative to one another in a horizontal direction in the plane of the two structures, that is, along the longitudinal axis of the cross members 21, 22. The brackets 13 are fixed to the cross members 21, 22 by the engagement of the teeth 14 in the cavities in the channel elements constituting the cross members.

In the case of the embodiment of Figure 7, it is possible to fix the shelves 1 to the frame constituted by the two structures 19, 20 by means of the brackets 13 and subsequently to modify the overall width of the entire structure by sliding the two structures 19, 20 and the shelves 1 simultaneously. The wall-mounted wall bar structure may also be used for supporting or anchoring other objects such as, for example, coat-hooks 24 or supports of the type indicated 25 in Figure 7, which may, for example, receive a racket 26.

The embodiments of Figures 10 to 11 differ from those described above mainly in that the support structure for the shelves is not intended to be fixed to a wall but is in itself able to support the shelves in a stable position. In the embodiment of Figure 9, the support structure is constituted by a series of corner support members 27 each constituted by two vertical walls 28 disposed substantially at right angles and joined together along a common edge. In the embodiment

illustrated, the two walls 28 are articulated together about this edge so that they can be folded against one another (see the position illustrated in broken outline in Figure 10) to facilitate transport. In the assembled condition, one of the two plates 28 is located in correspondence with the end edge of a shelf 1 and supports this shelf by means of pins 29 on which the lower edge of the end plate 7 rests. The said wall 28 has a plurality of holes 30 each of which can receive a pin 29 so as to allow the level of the shelf 1 to be chosen at will.

As illustrated in Figure 9, it is possible to mount several corner members 27 on top of each other so as to reach the desired height. The walls 28 of the corner members 27 which are adjacent the longitudinal edge of the shelves 1 define a back wall of the bookshelves.

A variant (Figure 11) is also provided which uses support members each comprising a central vertical wall 31 and two lateral vertical walls 32 articulated to the central vertical wall along the two longitudinal edges of the latter and disposed in planes perpendicular to the plane of the central vertical wall in the assembled condition. Each of the walls 31, 32 may support a corresponding shelf 1 so as to allow the bookshelves to be developed in three different directions as illustrated schematically in Figure 11.

In the embodiment of Figure 12, the support structure includes a plurality of blocks 33 of relatively heavy material (for example, refractory material or concrete) stacked in engagement with each other so as to define

uprights 34 for supporting the shelves 1. Each block 33 has upper and lower surfaces of complementary shape, so as to allow interlocking of the superposed blocks, and is also provided with ribs 35 on its main face. Each rib 35 in its turn has a groove 36 in its upper surface for receiving and supporting the lower edge of the end plate 7 of a corresponding shelf 1.

Naturally, the principle of the invention remaining the same, the constructional details and forms of embodiment may be varied widely with respect to those described and illustrated purely by way of example, without thereby departing from the scope of the present invention.

CLAIMS

1. Shelving, particularly for use as bookshelves, comprising a support structure (16;19,20;27;34) and a series of horizontal shelves (1) carried by the support structure, characterised in that each horizontal shelf (1) comprises a series of flat telescopic elements located side by side, so that it can assume any length between a minimum length and a maximum length.

2. Shelving according to Claim 1, characterised in that each telescopic element is constituted by two profiled elements (2a,2b) slidable one within the other and fixed respectively at their two opposite ends to two end plates (7) for attachment of the shelf to the support structure.

3. Shelving according to Claim 2, characterised in that the two end plates (7) are connected together by an auxiliary telescopic member (9).

4. Shelving according to Claim 3, characterised in that the auxiliary telescopic member (9) is located adjacent a longitudinal edge of the shelf (1) in a position spaced slightly above it.

5. Shelving according to Claim 4, characterised in that the auxiliary telescopic member (9) has travel limit means for limiting the maximum length of the shelf.

6. Shelving according to Claim 4, characterised in that it has a series of book-end brackets (10) each constituted by an elongate element (11) bent into a

closed profile and provided at its two adjacent ends with appendages (12) for engaging the auxiliary telescopic member (9) from opposite sides by resilient deformation of the element (11) constituting the bracket, so as to clamp the latter to the auxiliary telescopic member (9).

7. Shelving according to Claim 3, characterised in that the auxiliary telescopic member (9) has a circular section.

8. Shelving according to Claim 4, characterised in that the end plates (7) have profiles corresponding substantially to the lateral profile of the shelf (1) and each includes an upwardly-projecting lug (8) for supporting the auxiliary telescopic member (9).

9. Shelving according to Claim 2, characterised in that the profiled elements (2a, 2b) have a substantially C-section formed by a flat central wall (3,4) defining the upper surface of the shelf, and two longitudinal lateral walls (5,6) bent towards each other.

10. Shelving according to Claim 9, characterised in that the two longitudinal lateral walls (5) which define the two opposite longitudinal edges of the shelf (1) have rounded profiles.

11. Shelving according to Claim 2, characterised in that the support structure includes a wall-mountable frame and a series of brackets (13) projecting from the frame and provided with support means for the shelves (1).

12. Shelving according to Claim 11, characterised in that the support means include means for coupling the brackets (13) to the end plates (7) of the shelves.

13. Shelving according to Claim 12, characterised in that the coupling means comprise hook means (15) associated with each bracket (13), for receiving and supporting the lower edge of a corresponding end plate (7) of a corresponding shelf (1).

14. Shelving according to Claim 13, characterised in that means are provided for preventing relative movement between a bracket (13) and a shelf (1) in a direction transverse the longitudinal axis of the shelf (1).

15. Shelving according to Claim 14, characterised in that each bracket (13) has two hook appendages (15) spaced horizontally from each other and in that the lower edge of the corresponding end plate (7) of the corresponding shelf (1) has two end portions (7a) which can be received and supported within the seats defined by the hook appendages (15), and a central portion (7b) projecting downwardly relative to the two end portions (7a) and arranged to fit tightly between the two hook appendages (15) so as to prevent relative movement between the brackets (13) and the shelf (1) in a direction transverse the longitudinal axis of the shelf (1).

16. Shelving according to Claim 11, characterised in that the frame comprises a series of uprights (1) which can be fixed to a wall and are provided with a plurality of slots (16a), and in that each bracket (13) has a plurality of teeth (14) along its vertical edge engageable in the slots (16a) to connect the brackets

(13) to the upright (16).

17. Shelving according to Claim 16, characterised in that the uprights (16) are connected together in pairs by articulated X-shaped elements each constituted by a pair of rods (17) articulated together at their centres and having their ends (18) guided for sliding movement in the uprights (16).

18. Shelving according to Claim 17, characterised in that the frame further includes uprights (16) each disposed in correspondence with the central articulations of each articulated X-shaped element.

19. Shelving according to Claim 11, characterised in that the frame is shaped like gymnastic wall bars and is constituted by at least two structures (19,20) which are coplanar and slidable relative to each other in a horizontal direction in the plane of the structures, each including a pair of uprights (19a,19b; 20a,20b) joined together by a plurality of vertically spaced cross members (21,22).

20. Shelving according to Claim 19, characterised in that the two structures have the two respective uprights (19b,20b) which are furthest from each other connected rigidly to the respective cross members (21, 22) and the remaining two uprights (19a, 20a) disposed intermediate the two uprights of the other structure, each of these uprights (19a, 20a) being connected rigidly to the cross members (21,22) of the respective structure and having apertures (23) within which the cross members of the other structure are slidably guided.

21. Shelving according to Claim 20, characterised in that each bracket (13) has teeth (14) for connection to the cross members (21,22) of the structures.

22. Shelving according to Claim 21, characterised in that each of the cross members (21,22) is constituted by a channel-sectioned element with its cavity facing upwardly, and in that the teeth (14) of each bracket (13) engage in the cavity of the channel.

23. Shelving according to Claim 2, characterised in that the support structure includes a series of corner support members (27) each constituted by two vertical walls (28) joined along an edge and disposed substantially at right angles.

24. Shelving according to Claim 23, characterised in that the two vertical walls (28) are articulated together along the edge so that the corner support member (27) can be folded into a configuration of smaller bulk.

25. Shelving according to Claim 23, characterised in that at least one of the walls (28) has means for supporting the shelves (1).

26. Shelving according to Claim 25, characterised in that the support means comprise support pins (29) fixable in holes (30) formed in the wall (28) and intended to support the lower edges of the end plates (7) of the shelves (1).

27. Shelving according to Claim 2, characterised in that the support structure includes a series of support members each comprising a central vertical wall (31)

and two lateral vertical walls (32) joined to the central vertical wall along their two longitudinal edges and disposed in planes perpendicular to the plane of the central vertical wall.

28. Shelving according to Claim 2, characterised in that the support structure includes a series of blocks (33) of relatively heavy material which can be stacked and fitted together so as to form the uprights for supporting the shelves.

29. Shelving according to Claim 28, characterised in that each block (33) has a series of vertically spaced-apart ribs (35), each of which has a groove (36) in its upper surface for receiving and supporting the lower edge of a corresponding end plate (7) of a corresponding shelf (1).

FIG. 1

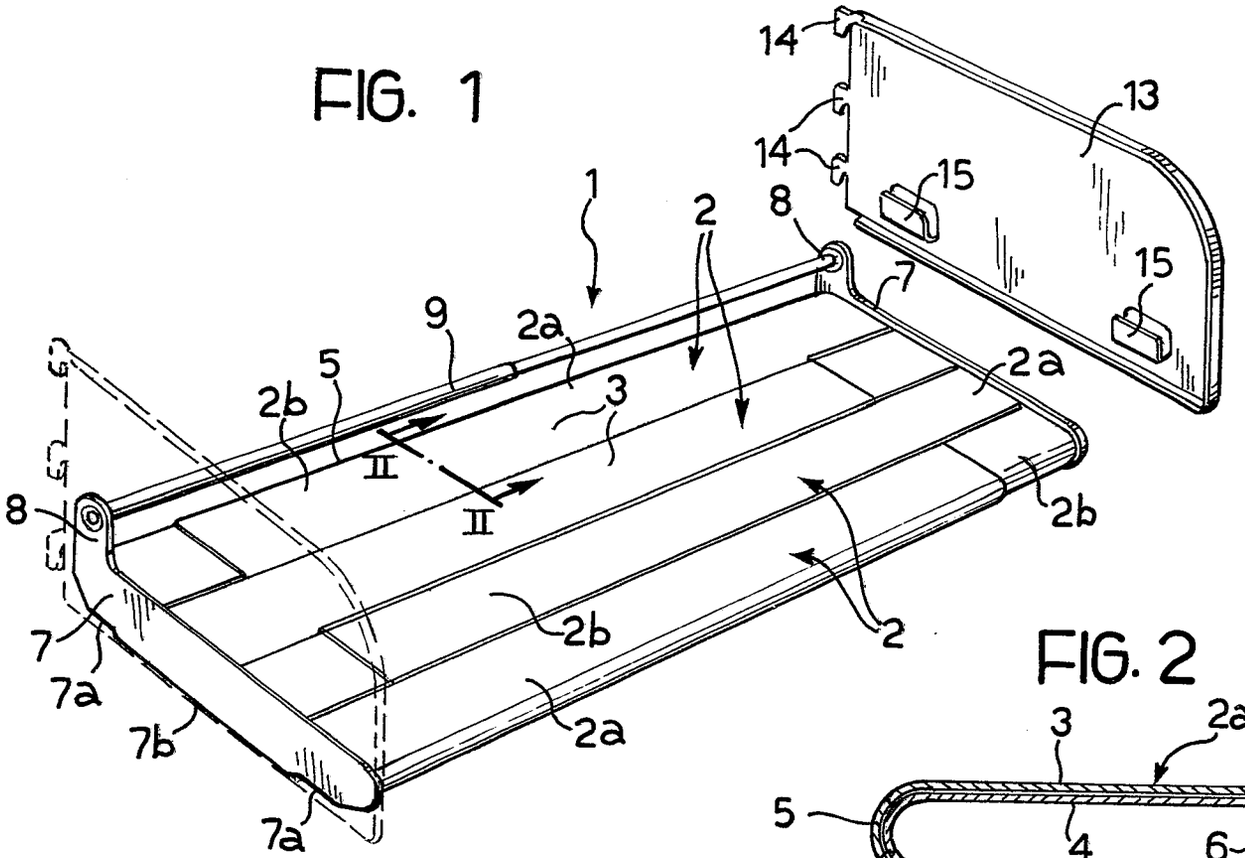



FIG. 2

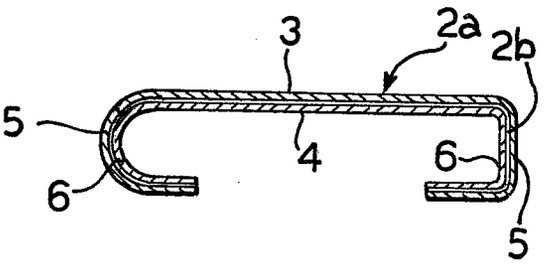



FIG. 3

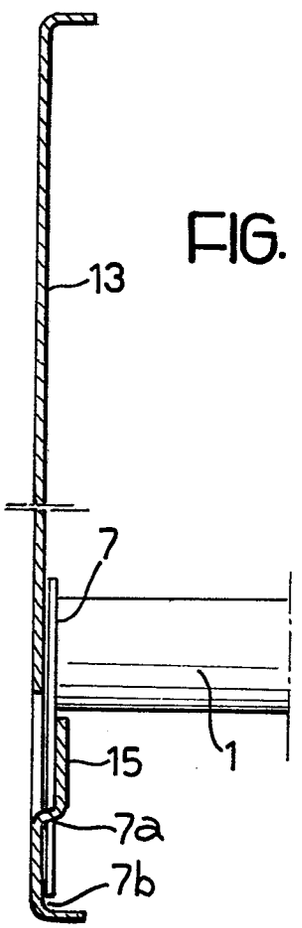



FIG. 5

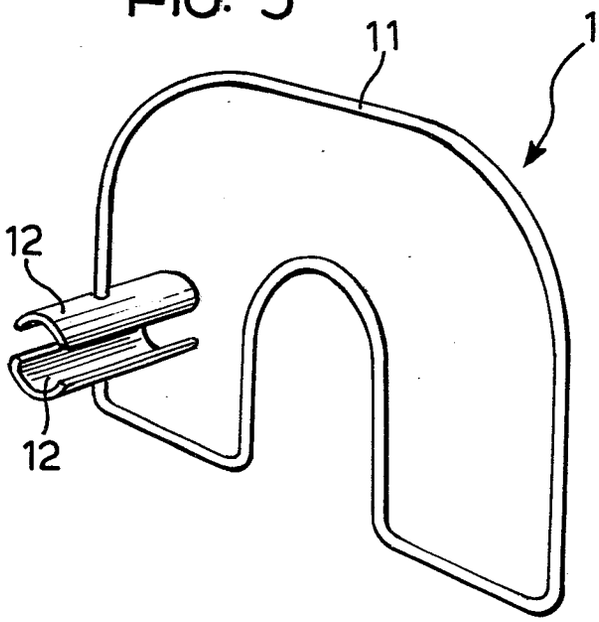


FIG. 4

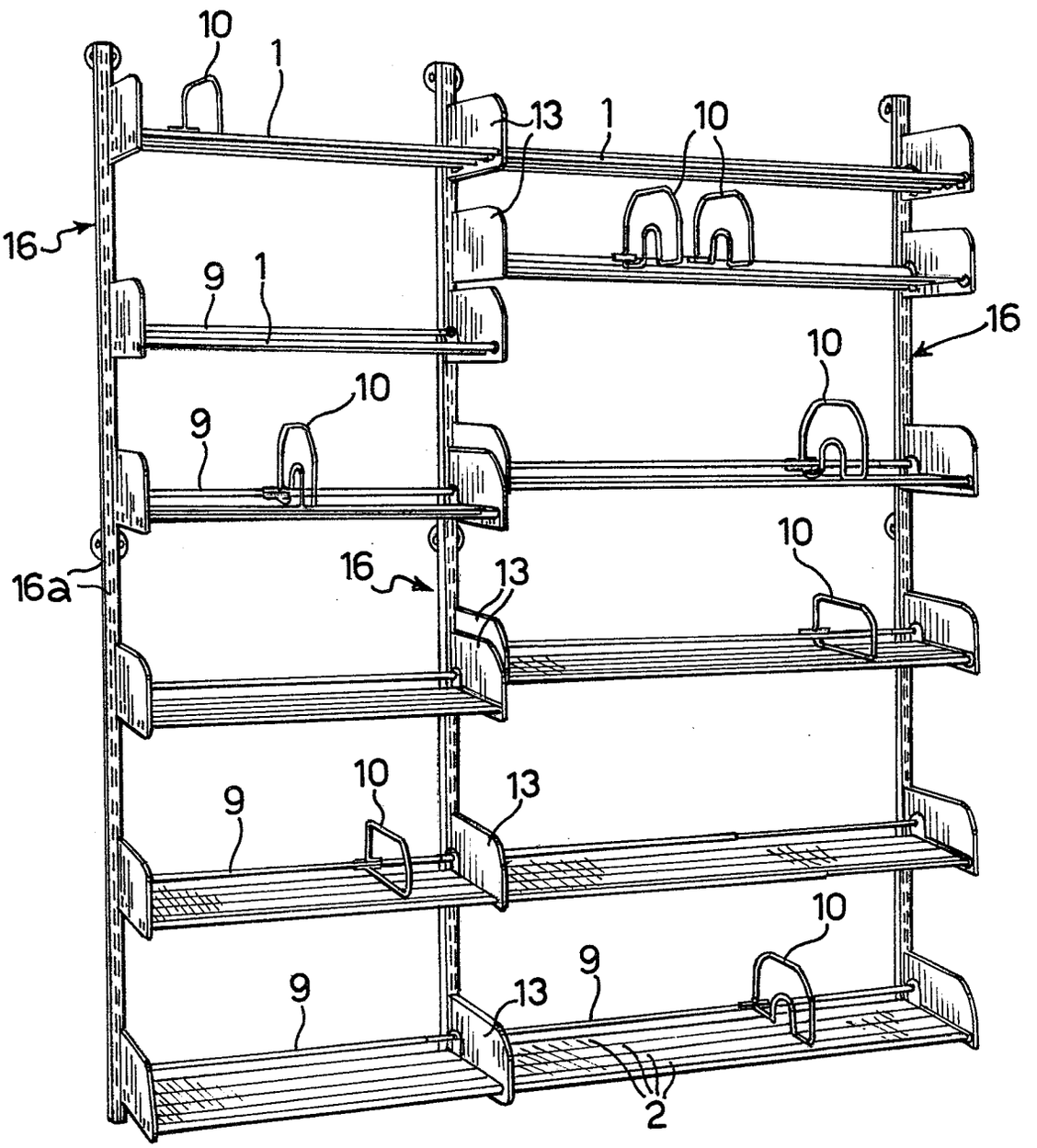


FIG. 6

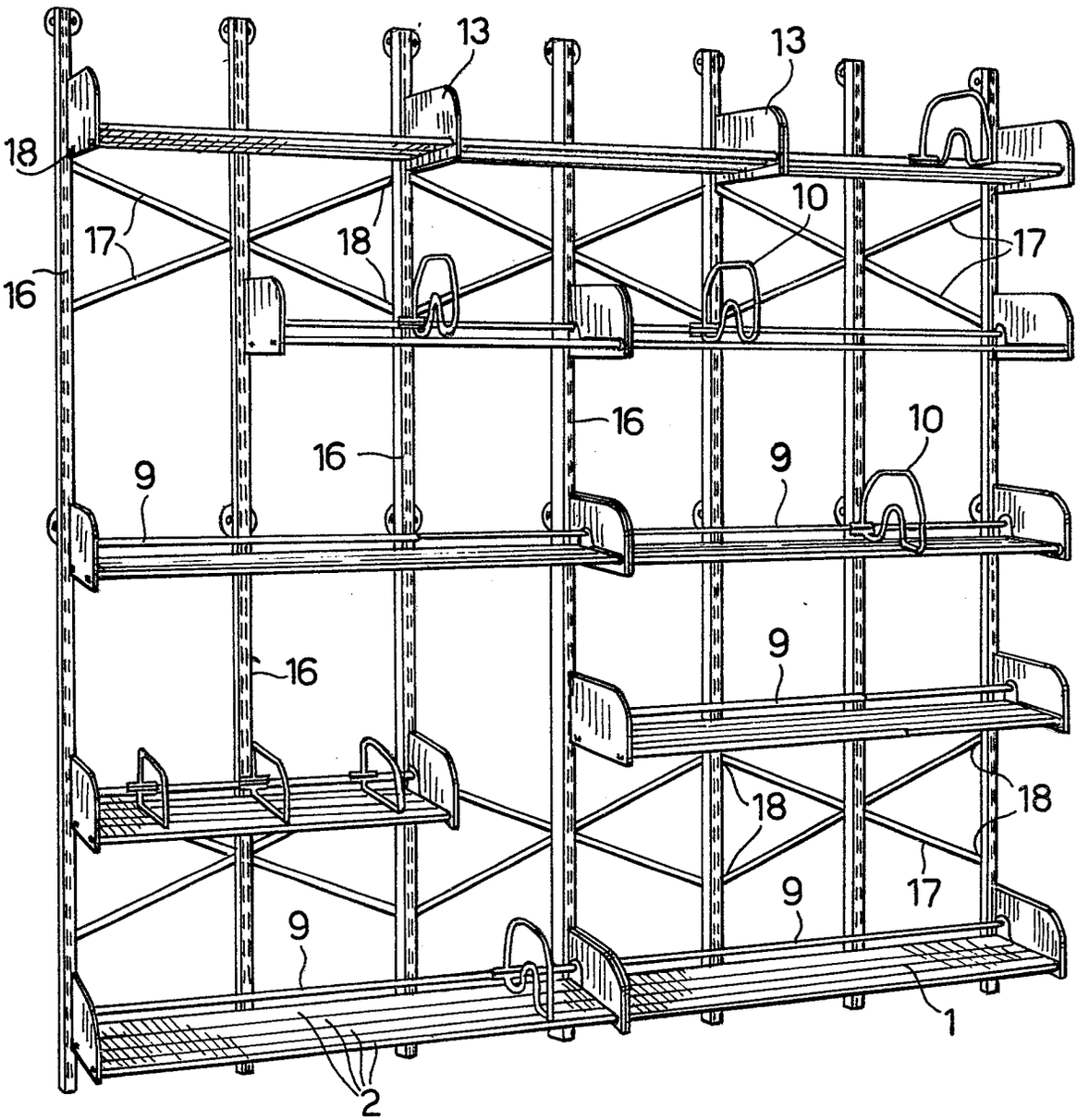


FIG. 7

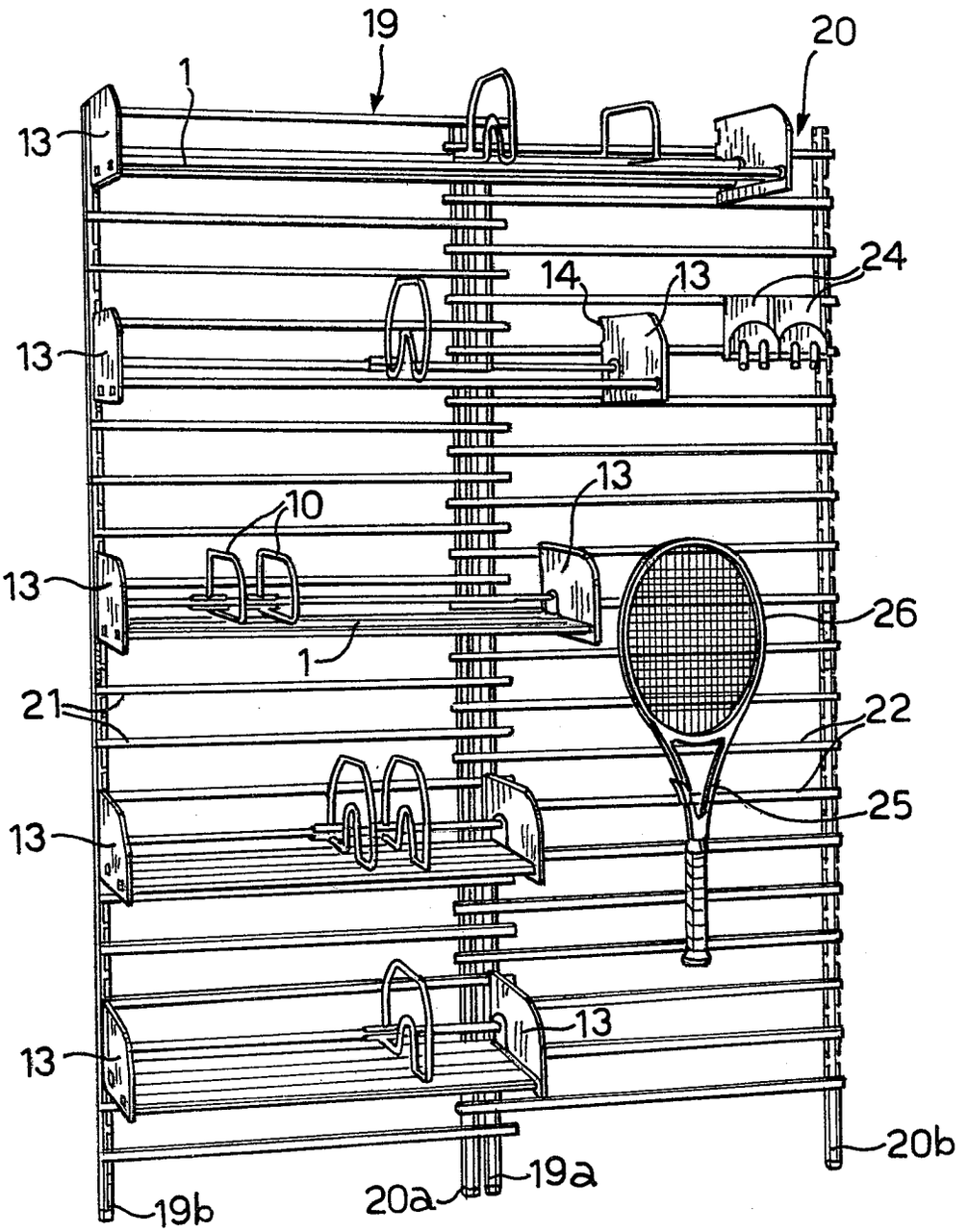


FIG. 9

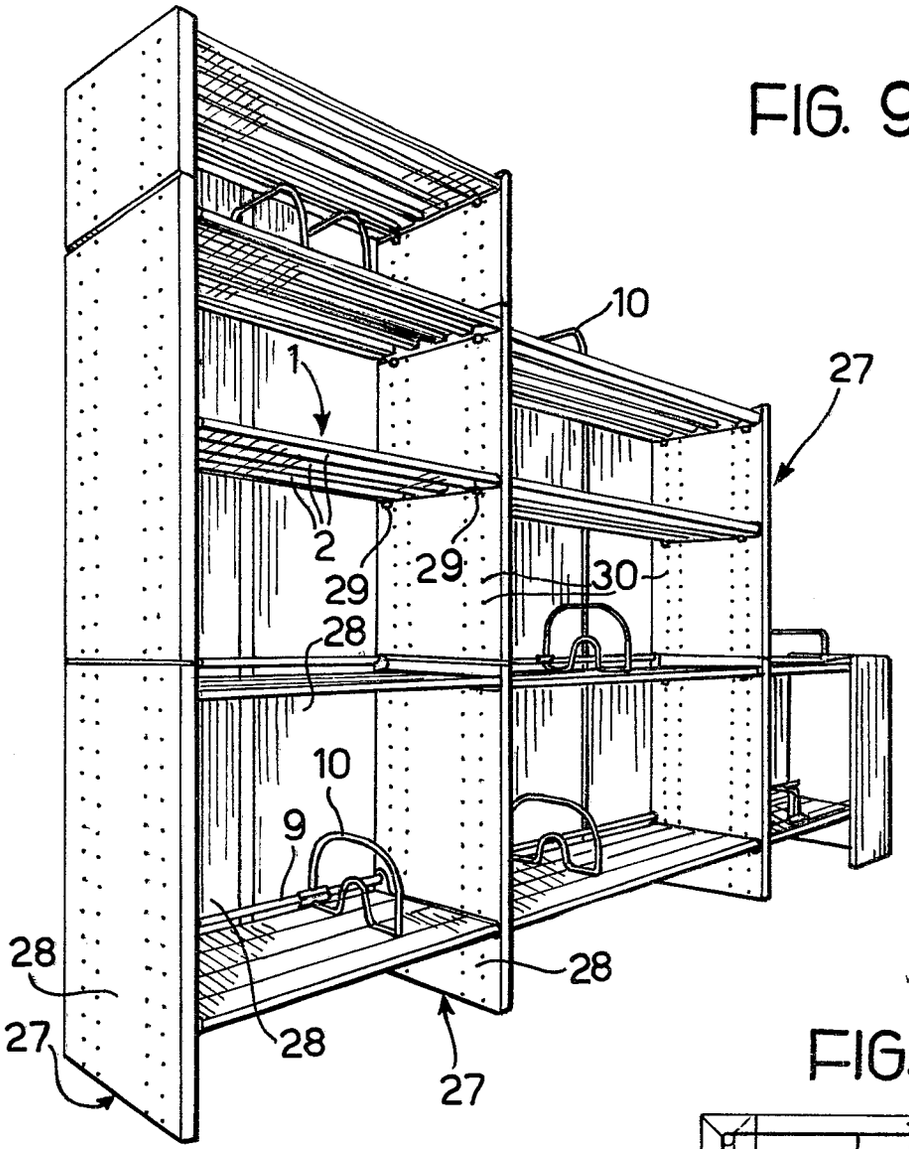



FIG. 10

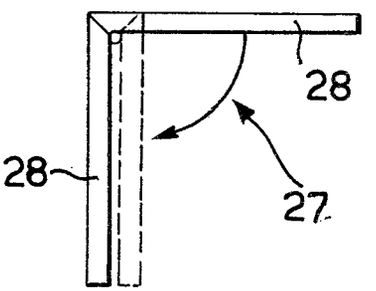



FIG. 8

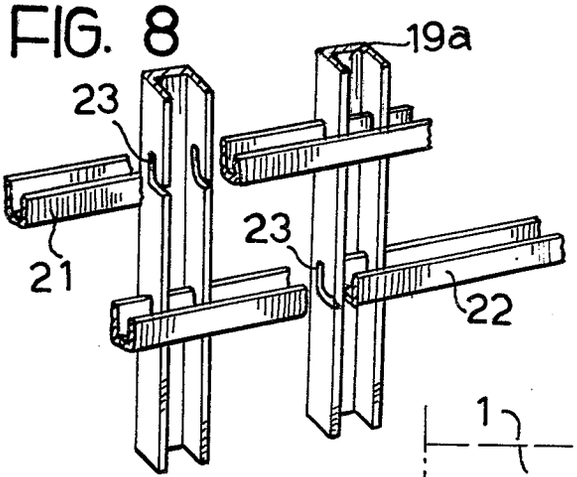



FIG. 11

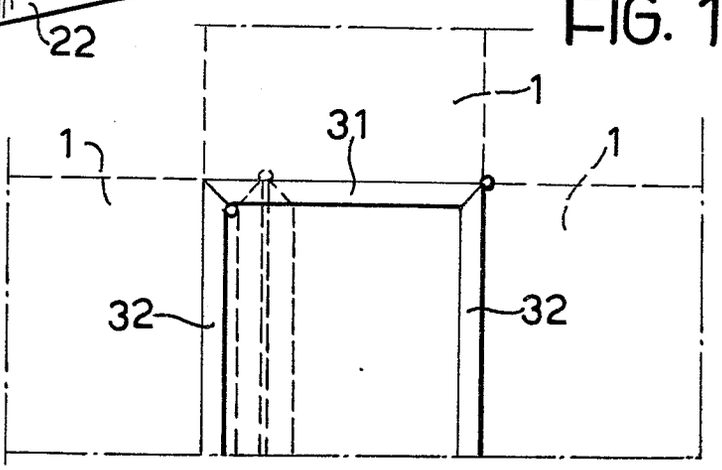


FIG. 12

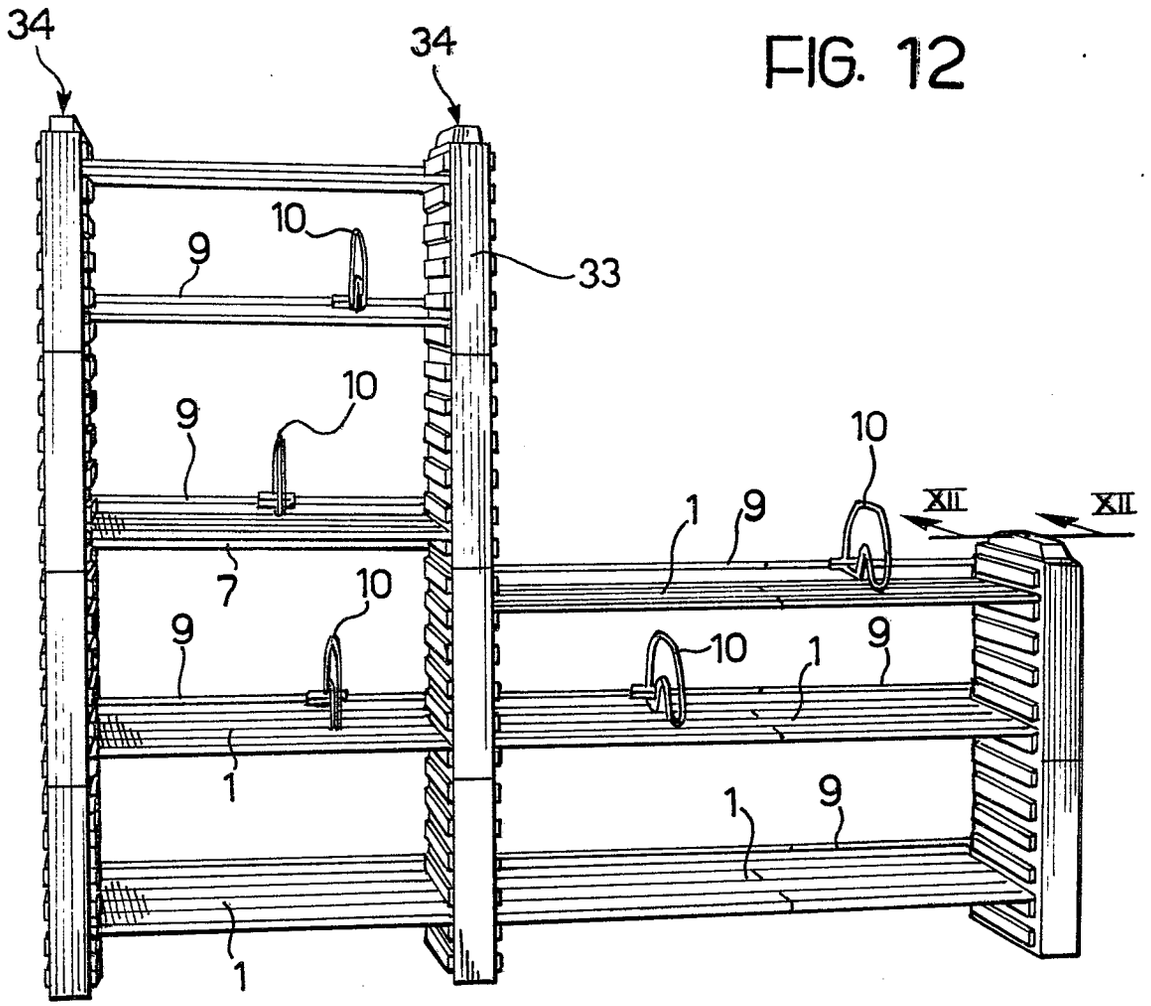



FIG. 13