May 27, 1958 W. H. FÜRRER 2,836,304

RACK CONSTRUCTION

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Fig. 1

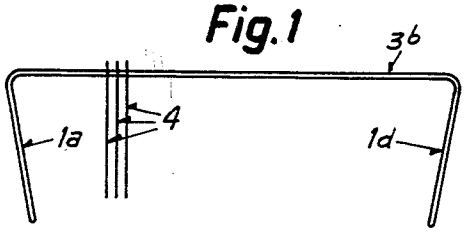


Fig. 2

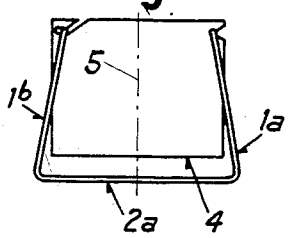


Fig. 3

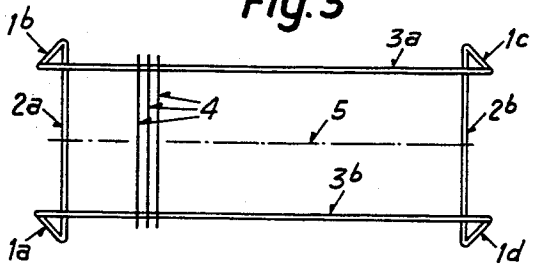


Fig. 4

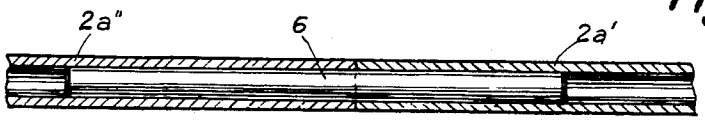


Fig. 5

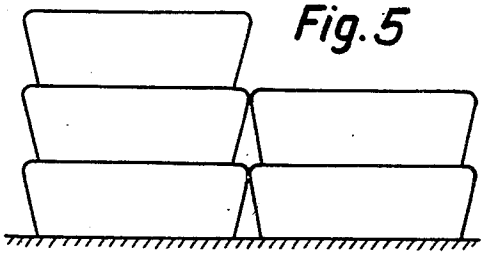
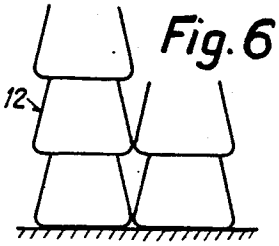


Fig. 6



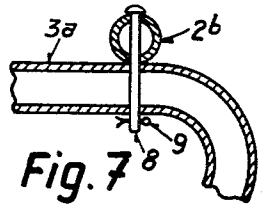


Fig. 7

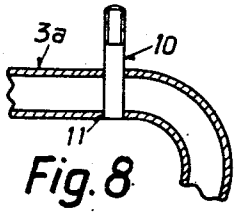


Fig. 8

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RACK CONSTRUCTION

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5 Claims. (Cl. 211—46)

The present invention relates to a rack which is constructed of independent rack units and can be used for hanging files, shelves and similar purposes.

In offices, business premises and storehouses there is often the desire for a rack the dimensions and capacity of which can be varied. Shelves of this type that can be built up out of independent units are already well-known, and files that can be assembled from individual groups also exist. Yet these always involve heavy and expensive constructions which are difficult to adapt to the given available space or arrangement. Consequently the need exists for a rack which is simple to store, easy to erect and inexpensive, and which can be adapted with difficulty to all purposes and any conditions of space.

An object of the present invention is a provision of a rack construction by means of which storage capacity can be varied in a simple manner.

Another object is the provision of rack units which can be transported easily and several of which can be conveniently assembled to form a rack construction.

A further object is the provision of a rack construction consisting of individual units which may be conveniently assembled or disassembled to vary the storage capacity of the rack construction.

Yet another object is the provision of a rack unit formed of rods which are arranged in such manner as to permit the positioning of a plurality of units one on top of the other to form a rack construction.

The present invention relates to a rack of this type for hanging files, shelves and similar purposes, built up out of independent rack units, wherein each rack side of the four-sided rack unit consists of bent members and represents a U-shaped frame, the opposite rack sides are equal and the two other sides form a frame possessing the shape of an inverted U, and one of the four corner arms is in each case common to successive rack sides, characterized by the fact that all the angles of the U-frame are less than 90° and each two opposite frame sides joining the corner arms run approximately parallel to one another.

A few typical examples of the invention are hereinafter described in detail with the aid of Figures 1 to 8. In the drawing:

Figs. 1, 2 and 3 are a front view, side view and horizontal projection of a typical example of the rack unit according to the invention.

Fig. 4 is a partial longitudinal section illustrating the connection between two members forming a rack unit on an enlarged scale.

Fig. 5 is a diagrammatic front view illustrating a plurality of racks placed one on top of the other.

Fig. 6 is a side view of the device shown in Fig. 5.

Figs. 7 and 8 show typical connections between the contact points of neighboring rack units in the assembled rack as shown in Figs. 5 and 6.

Figs. 1, 2 and 3 show in front view, side view and horizontal projection a typical example of the rack unit according to the invention consisting of bent members. As

can be seen, it is a four-sided rack unit in which each of the four sides is formed by a U-shaped frame. Moreover, opposite rack sides are in each case equal, which can be seen from Figs. 1 and 3 as regards the front and rear sides of the rack, as well as the left and right sides. The rack unit possesses four corner arms *1a, b, c, d*, each one of which is common to two neighboring rack sides. The corner arms are interconnected: corner arms *1a, 1b* by the frame side *2a* and the opposite corner legs *1c, 1d* by the equal frame side *2b*; also the corner arms *1b, 1c* by the frame side *3a* and the opposite corner legs *1d, 1a* by the equal frame side *3b*. Opposite bottom frame sides, that is to say, *2a* and *2b*, are approximately parallel to each other.

Racks consisting of bent members and with U-shaped sides have in themselves been known for a long time, particularly for tubular steel furniture and similar products. The rack according to the invention, however, differs from these known rack forms owing to its main feature according to which all the angles of the U-frames forming the rack sides are less than 90°. This is true both of the angles between the corner arms *1a, 1b*, or *1c, 1d* and the frame sides *2a* or *2b*, as can be seen from Figs. 2 and 3, and also of the angles between the corner arms *1b, 1c* or *1d, 1a* and the top frame sides *3a* or *3b*, as is shown in Figs. 1 and 3. This oblique-angled formation of the rack unit consisting of bent members results in substantial advantages for the erecting of racks consisting of several units located one on top of the other and/or side by side, as will be described later.

The length of the four corner arms *1a, 1b, 1c, 1d* is preferably equal, but the frame sides *2a, b* and *3a, b*, connecting in each case two corner arms, are preferably of different lengths, as is shown by the typical example of the rack unit in Figs. 1 to 3. In these, two rack sides have the shape of an upright U, in this case the rack sides formed by the U-frames *1a, 2a, 1b or 1c, 2b, 1d*. The other two rack sides have accordingly the form of an inverted U, in this case the rack sides formed by the U-frames *1b, 3a, 1c* or *1d, 3b, 1a*. The frame sides *2a, 2b*, consequently located underneath, serve as support for the rack and carry the rack unit in question. The top frame sides *3a, 3b*, on the other hand, are, as is indicated in Figs. 1 to 3, used as hanging bars for suspendable filing aids, hanging folders 4 for instance, or serve as support rods on which trays can be laid, in the event of the rack unit in question being designed entirely or partially as a shelf. According to the purpose intended the lengths of the frame sides *2a, 2b* serving as a rack support are chosen such that the requisite distance is obtained between the approximately parallel and top frame sides *3a, 3b*. The length of the top frame sides *3a, 3b* vary only according to the desired capacity of each rack unit, but is limited by the weight of the objects to be suspended in the rack or placed on top of it.

The typical example of the rack unit shown in Figs. 1 to 3 comprises thin-walled tubes as bent members. Said tubes are preferably made of metal, possibly steel tubes seamless-drawn and chrome-plated after bending. The present invention, however, is not restricted to this, and other suitably shaped hollow and solid profiles can be used, both those made of metal and those of non-metallic material of corresponding bending strength, possibly wood, plastic and similar material.

The rack unit described with the aid of Figs. 1 to 3 can indeed, if required, be bent out of one single member, the two ends of which can then be indissolubly joined together, but it is preferable that according to the invention the rack unit be assembled from at least two structural parts. For example, two structural parts can be provided, one of which parts includes the frame side *3a* together with the two corner arms *1b, 1c*, as well

as half of each of the frame sides 2*a*, 2*b* on the lower ends of the said corner arms, whereas the other part consists of the frame side 3*b*, the two corner arms 1*a*, 1*d* and half of each of the frame sides 2*a*, 2*b* at the lower ends of the said corner arms. The rack unit according to Fig. 3 is thus divided up into the two structural parts along the symmetry plane indicated by the line 5 in Figs. 2 and 3.

Fig. 4 shows a suitable type of connection for the rack members in axial section. One of the ends of the rack members, such as the portion 2*a'* of the bottom frame side 2*a* is provided with a rod member 6 which is inserted into the bottom frame portion 2*a''*. The connection of the two portions of the bottom frame 2*b* may be effected in a similar manner.

The subdivision of each rack unit into two or more structural parts offers significant advantages for manufacture, transport and storing, since the dividing up of a rack unit along symmetry planes gives structural parts that are always congruent, that can be manufactured in the same bending devices and, laid one on top of the other, require substantially less space than whole rack units. The dividing up of a rack unit can also be effected in accordance with symmetry planes other than the one illustrated in Figs. 2 and 3, so that the joints of the structural parts in the assembled rack unit are not in the middle of the frame sides 2*a*, *b* forming the rack support, but are for instance in the middle of the frame sides 3*a*, *b*.

If the connecting pieces 6 and/or the halves of the frame sides 2*a* or 2*b*, which are to be joined together, are provided with several holes 6*a* or 15, or both for securing purposes, said holes being a uniform distance apart, the two structural parts can be joined together in such a way that the distance between frame sides 3*a*, 3*b* of the rack unit can be varied and determined in advance.

The rack unit described above is according to the invention assembled into larger rack groups by arranging several such units on top of each other and side by side, as is shown diagrammatically in front and side views in Figs. 5 and 6. The fact that the distance between the frame sides 2*a*, 2*b* which serve as support for the rack, is in each case less than the length of the frame sides 3*a*, 3*b*, and, on the other hand, the fact that the length of the frame sides 2*a*, 2*b* is in each case greater than the distance between the frame sides 3*a*, 3*b*, enables several rack units to be placed one on top of the other. In this case, then, the frame sides 2*a*, 2*b*, which serve as support for the rack, rest on the frame sides 3*a*, 3*b* of the rack unit underneath, the ends of the frame side 2*a* each having a point of contact on the ends of the frame sides 3*a* and 3*b*, and similarly the ends of the frame side 2*b* on the ends of the frame sides 3*a*, 3*b*. The frame sides 2*a*, *b* cross approximately at right angles with the frame sides 3*a*, *b* at these four contact points between each following and each preceding rack unit. This crossing point of the frame sides 2*b* and 3*a* is illustrated in section in Fig. 7, which supposes that tubes are being used as bent members. At these contact points the rack units arranged one on top of the other are connected together by a pin 8, for instance, which is inserted into corresponding holes in the frame sides 2*b*, 3*a* and secured by a cotter pin 9. This manner of connecting rack units arranged one on top of the other is on the one hand readily releasable, but on the other hand rigid enough to ensure that several rack units one on top of the other will hold together. Instead of a pin secured with a cotter pin it is, of course, also possible to use bolts and nuts or other suitable connections. For instance, as is shown in Fig. 8, the top girder sides 3*a*, 3*b* can in each case also be provided at the bearing points with upward projecting screwed bolts 10 on which the girder sides 2*a*, 2*b* of the following rack units are placed, said sides being provided with corresponding holes, and are secured in any suitable manner. The bolts 10 can be soldered or welded at 11.

An assembled rack, however, can also be produced by arranging rack units side by side, as is shown in Figs. 5 and 6, it being possible to place said units both beside and behind one another. In this arrangement neighboring rack units always touch either at the top or the bottom ends of each pair of corner arms and at these contact points said rack units are secured together in an easily releasable manner. This securing can be designed similarly to that shown in Fig. 8, or can also be effected by means of bolts and nuts or in some other suitable way.

As can be seen from Figs. 5 and 6, great stability is ensured in joining several rack units together to form a rack group by securing the rack supports in each case to corresponding frame sides and by securing the corresponding corner arms to each other.

What I claim is:

1. In a storing device composed of a plurality of superposed independent units, a rack unit comprising two parallel top frame sides having bent ends, corner arms connected with said bent ends, each corner arm extending downwardly in two oblique directions, namely, in the direction toward the corner arm of the same top frame side and in the direction away from the opposite corner arm of the other top frame side, and two parallel bottom frame sides, each bottom frame side joining the ends of two opposed corner arms and extending transversely to said top frame sides, each top frame side with the corner arms connected therewith having substantially the shape of an inverted U and being located in an obliquely extending plane, each bottom frame side with the corner arms connected therewith having substantially the shape of a U and being located in an obliquely extending plane.

2. A storing device having a plurality of independent rack units, each of said rack units comprising two parallel top frame sides having bent ends, corner arms connected with said bent ends, each corner arm extending downwardly in two oblique directions, namely, in the direction toward the corner arm of the same top frame side and in the direction away from the opposite corner arm of the other top frame side, and two parallel bottom frame sides, each bottom frame side joining the ends of two opposed corner arms and extending transversely to said top frame sides, each top frame side with the corner arms connected therewith having substantially the shape of an inverted U and being located in an obliquely extending plane, each bottom frame side with the corner arms connected therewith having substantially the shape of a U and being located in an obliquely extending plane, one of said rack units being located above another one of said rack units, each one of bottom frame sides of said one rack unit resting on said two top frame sides of said other rack unit adjacent to the bent ends of said two top frame sides and extending transversely to the latter, said one rack unit being thereby supported by said other rack unit.

3. A rack construction comprising a plurality of superposed independent rack units, each of said rack units having two parallel top frame sides having bent ends, corner arms connected with said bent ends, each corner arm extending downwardly in two oblique directions, namely, in the direction toward the corner arm of the same top frame side and in the direction away from the opposite corner arm of the other top frame side, and two parallel bottom frame sides, each bottom frame side joining the ends of two opposed corner arms and extending transversely to said top frame sides, each top frame side with the corner arms connected therewith having substantially the shape of an inverted U and being located in an obliquely extending plane, each bottom frame side with the corner arms connected therewith

having substantially the shape of a U and being located in an obliquely extending plane; one of said rack units being located above another one of said rack units, each one of bottom frame sides of said one rack unit resting on said two top frame sides of the other rack unit adjacent said bent ends of said two top frame sides and extending transversely to the latter, and connecting means securing said one rack unit to said other rack unit via said bottom frame sides and said top frame sides, to thereby improve the stability of the rack construction.

4. A rack construction according to claim 3, each of said bottom frame sides and said top frame sides having bores; said connecting means comprising pins extending through respective ones of said bores to effect securement of said one rack unit to said other rack unit.

5. A rack construction according to claim 3, wherein each rack unit consists of two identical members, said members being releasably interconnected to permit separation thereof for storing and transport of said rack units.

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