Jan. 30, 1951 C. E. MEEK, JR., ET AL 2,539,919

CHAIR CONSTRUCTION

Filed April 23, 1947

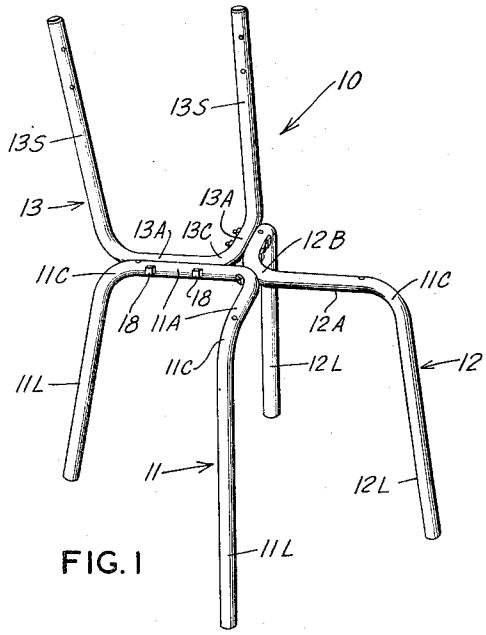



FIG. 1

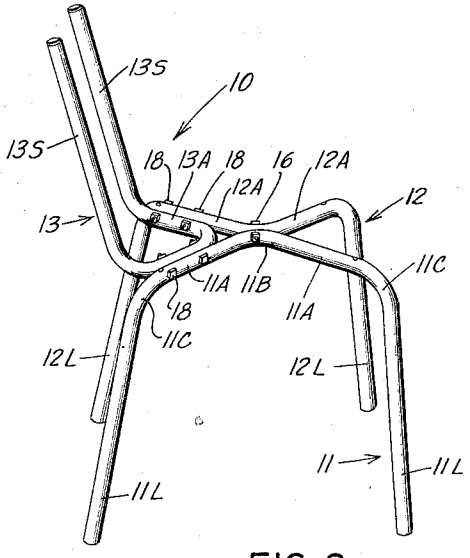



FIG. 2

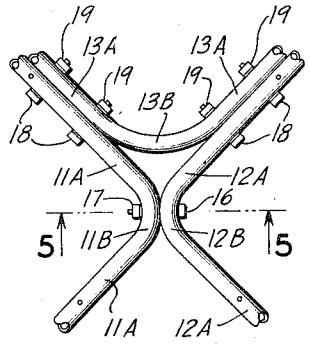



FIG. 4

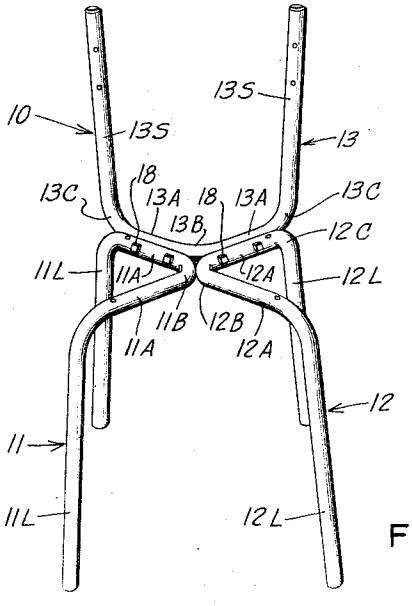



FIG. 3

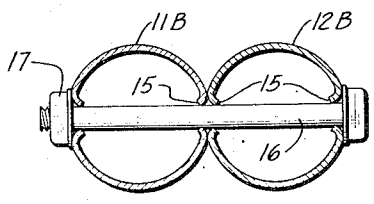



FIG. 5

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Patented Jan. 30, 1951 2,539,919

# UNITED STATES PATENT OFFICE

2,539,919

## CHAIR CONSTRUCTION

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Application April 23, 1947, Serial No. 743,390

7 Claims. (Cl. 155—194)

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This invention relates to furniture and particularly to tubular metal chair frames.

It has long been recognized that tubular metal framed chairs could be more economically manufactured and distributed if the elements of such chairs could be shipped in knocked down, or KD form to the ultimate retail outlet, for assembly by the retailer or the purchaser, and while an approach has been made to such procedure through shipment of the seats and backs separate from the frames so as to enable nesting of the frames in shipment, this has not been satisfactory in many instances because the requisite economy in space and packaging under such an arrangement is attained only when the shipments are relatively large. Moreover, under such prior arrangements, the elements of a single chair cannot be economically packed in a single or individual container or package, for packing in a single container would under such circumstances require a container of substantially the same size as a fully assembled chair.

It is therefore an important object of the present invention to enable the frame for a tubular metal chair to be so formed that the several frame elements that are to make up the rigid back support and leg structure are of relatively small size and are of substantially the same form so that all of the frame elements for a single chair may be nested in a compact relation in a relatively small and convenient package. Another object related to the foregoing is to enable all of the metallic frame elements of such a chair to be so formed that they may be conveniently nested together in a group which is adapted for packing in a compact and efficient relation in a packing carton with the back and seat elements that are to be mounted on such frame elements.

In the past, it has been recognized that one of the primary difficulties in affording a KD chair construction has centered around the difficulties of attaining rigid assembly of the separate frame units, and it is because of this, that past efforts to afford a KD chair have been confined principally to the shipment of the seats and backs separate from the chair frames. It is therefore a further and important object of the present invention to enable the frame elements of such a chair to be rigidly secured together through the use of simple bolts that may be readily applied by unskilled workmen; and an object related to the foregoing is to enable the form and relation of the frame elements and the disposition of the fastening bolts to cooperate to attain a

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trussing or bracing action which assures rigidity in the assembled chair frame.

Other and further objects of the present invention will be apparent from the following description and claims and are illustrated in the accompanying drawings which, by way of illustration, show a preferred embodiment and the principles thereof and what we now consider to be the best mode in which we have contemplated applying those principles. Other embodiments of the invention embodying the same or equivalent principles may be used and structural changes may be made as desired by those skilled in the art without departing from the present invention and the purview of the appended claims.

In the drawings:

Fig. 1 is an angular perspective view of a chair frame embodying the invention;

Fig. 2 is a side perspective view of the chair;

Fig. 3 is a front perspective view of the chair;

Fig. 4 is a fragmentary plan view; and

Fig. 5 is a sectional view at an enlarged scale taken along the line 5—5 of Fig. 4.

For purposes of disclosure the invention is herein illustrated as embodied in a chair frame 10 comprised of three tubular metal frame elements 11, 12 and 13 that are generally similar in form so as to be adapted for convenient and compact packaging in a knocked down or KD relationship and which may be quickly and easily assembled to afford a rigid and extremely rugged and strong chair frame. The three frame elements 11, 12 and 13 are, in general form, what have been termed hairpin bend elements in that they are each generally U-shaped in form. It will be observed, however, that at the closed end of its U-shaped form, each element is bent to a plane generally perpendicular to the side members of the U to form connecting portions, and with this arrangement, the connecting portions of the three frame elements are utilized to enable the frame elements to be connected together in locations that will be concealed beneath the chair seat so as to thereby form the chair frame.

Thus, the frame element 11 is made from a single steel tube and comprises straight mounting or connecting arms 11A joined by a rounded or arcuate bend 11B, and to the opposite ends of the arms 11A, legs 11L are joined by rounded or arcuate bends 11C. Similarly, the frame element 12 is made from a single steel tube to afford a pair of mounting or connecting arms 12A joined by an arcuate or rounded bend 12B, and having legs 11L at the ends of the arms 12A and joined thereto by rounded bends 12C. The frame ele-

ment 13 is also formed from a single steel tube to afford mounting or connecting arms 13A joined by an arcuate or rounded bend 13B and having back supports 13S that are joined by rounded bends 13C to the other ends of the arms 13A.

Thus, the arms 11A and the connecting bend 11'B afford a generally V-shaped connecting portion for the frame element 11; the arms 12A and the rounded bend 12B afford a generally V-shaped connecting portion for the frame element 12; and the arms 13A and the rounded bend 13B afford a generally V-shaped connecting portion for the frame element 13. In the assembly of the chair frame, the connecting portions of the frame elements 11 and 12 are disposed in a common plane with the rounded bends 11B and 12B in opposed external contact, and in this relationship, openings 15 formed in the rounded bends 11'B and 12B are disposed in alignment. A fastening bolt 16 is then extended through the openings 15 and a nut 17 is threaded onto the bolt 16 so as to draw the bends 11B and 12B tightly together, as shown in Figs. 4 and 5.

When the frame elements 11 and 12 are thus connected, the arms 11A and 12A thereof are disposed in a generally cruciform relation so as to afford an angle between the two rear arms 11'A and 12A, and the connecting portion of the frame element 13 is disposed within this angle and in the aforesaid common plane so that the arms 13A are disposed along the rear sides of the rear arms 11A and 12A and are firmly connected thereto.

Thus, the rear arms 11A and 12A each have a pair of openings formed therethrough, similar to the openings 15 and spaced longitudinally of such arms, and corresponding openings are formed in the arms 13A so as to be aligned with the openings in the rear arms 11A and 12A when the frame element 13 is positioned as aforesaid. The interconnection of the frame elements is completed by extending fastening bolts 18 through such aligned openings in the arms 13A and the rear arms 11A and 12A, and tightening nuts 19 thereon so as to draw the opposed pairs of bars tightly together.

With the chair frame that is thus afforded, an exceptional degree of rigidity is attained despite the simplicity of the fastening means. This rigidity results from the use of two fastening bolts 18 for securing each of the frame members or elements 11 and 12 to the common frame member 13 and from the further fact that the bolt 16 fastens the frame elements 11 and 12 together at a point which is located forwardly of the intersection of the planes which pass through the lines of contact of the members 11A and 12A with the members 13A. By virtue of this manner of connection, any tendency of one of the frame elements 11A or 12A to rock about its line of contact with the frame element 13 is resisted by the connection afforded by the bolt 16. This action is due at least in part to the fact that the points at which the bolt 16 engages the frame element 12A for example, are located laterally with respect to the axis upon which any such rocking movement might tend to take place, and in practice it has been found that the chair frame as thus provided is extremely rigid and effectually withstands the forces usually applied to chair frames.

It will be observed that as herein disclosed, the three frame elements 11, 12 and 13 are of the hairpin bend type so that the leg structures are afforded on the two frame elements 11 and 12 while the back supports are afforded on the frame element 13. Through this arrangement, the frame elements are adapted for packing in an unusually small package which affords room beside the longitudinal elements 11L, 12L and 13S for the seat and the back elements of the chair. This arrangement of course enables the packing of all the elements of a chair in a single package of relatively small size. It will be evident however that where this advantage of small size of the packing unit may be eliminated, the rear leg elements might well extend downwardly from the elements 13A and the seat supports might well extend upwardly from the elements 11A and 12A respectively. In such an instance, the advantages insofar as convenience of assembly and rigidity would be attained.

From the foregoing description, it will be evident that the present invention enables a chair frame to be shipped in a convenient and compact individual package, and it also enables such individual frame elements to be conveniently assembled to afford a rigid chair frame.

Thus, while we have illustrated and described the preferred embodiment of our invention, it is to be understood that this is capable of variation and modification and we therefore do not wish to be limited to the precise details set forth, but desire to avail ourselves of such changes and alterations as fall within the purview of the following claims.

We claim:

1. In a chair frame, a seat support comprising three tubular elements each bent to a generally V-shaped form and affording in each element a pair of straight arm portions joined by an arcuate portion, two of said elements being disposed in a common plane with said arcuate portions in external contact, a bolt extending through said engaged arcuate portions to connect the same, the other of said elements being disposed in said plane with the portions thereof parallel to and engaged respectively with corresponding arms of the said first two of said elements, a pair of fastening bolts extended through each pair of parallel arms at spaced points spaced longitudinally thereof, a pair of tubular legs extended integrally from one arm of each of said pairs of arms, a tubular back support extended integrally in a direction generally opposite to said legs from each of the other arms of said pairs of arms, and a tubular leg extended integrally from each of the other arms of said first mentioned two of said elements.

2. In a chair frame, a seat support comprising three tubular elements each bent to a generally V-shaped form and affording in each element a pair of straight arm portions joined by an arcuate portion, two of said elements being disposed in a common plane with said arcuate portions in external contact, a bolt extending through said engaged arcuate portions to connect the same, the third one of said elements being disposed in said plane with the portions thereof parallel to and engaged respectively with corresponding arms of the said first two of said elements, a pair of fastening bolts extended through each pair of parallel arms at spaced points spaced longitudinally thereof, a pair of tubular legs extended integrally from each of the arms of said two elements, and tubular back supports extended integrally in a direction generally opposite to said legs from each of the arms of said third frame element.

3. In a chair frame adapted to be shipped in

knocked down form, three tubular elements adapted to afford a seat support and each bent to a generally V-shaped form affording in each element a pair of straight arm portions joined by an arcuate portion, two of said elements being adapted to be disposed in a common plane with said arcuate portions in external contact and said two elements having fastening openings formed in alignment therein in said arcuate portions to receive a fastening bolt in a position wherein it extends through said engaged arcuate portions to connect the same, the other of said elements being adapted to be disposed in said plane with the portions thereof parallel to and engaged respectively with corresponding arms of the said first two of said elements, said pairs of arms having aligned openings therein at spaced points spaced longitudinally thereof to receive fastening bolts for securing said pairs of arms together, a pair of tubular legs extended integrally from one arm of each of said pairs of arms, a tubular back support extended integrally in a direction generally opposite to said legs from each of the other arms of said pairs of arms, and a tubular leg extended integrally from each of the other arms of said first mentioned two of said elements.

4. In a chair frame, three frame elements each formed from a single metal tube to afford in each frame element a V-shaped connecting portion affording connecting bars joined by a rounded bend at the angle of the V and integral support bars joined by rounded bends to opposite ends of the respective connecting bars and extended generally at right angles with respect to the plane of said V-shaped connecting portion, the rounded bends of two of said connecting portions being disposed in opposed relation to dispose said connecting portions of said two connecting portions in a common plane with the connecting bars arranged in substantially a cruciform relationship, a bolt extended through the opposed rounded bends, the connecting portion of the other frame element being disposed in said common plane in the angle between corresponding connecting bars of said two frame elements, and a pair of connecting bolts extending through each connecting bar of said other frame element at points spaced longitudinally of such bar and extending through the adjacent connecting bar of said two frame elements to secure the three frame elements together, the relationship of said frame elements being such that four of said support bars extend generally in the same direction from said common plane to afford chair legs, while two of said support bars extend in the other direction from said common plane to afford back supports.

5. In a chair frame, three frame elements each formed from a single metal tube to afford in each frame element a V-shaped connecting portion affording connecting bars joined by a rounded bend at the angle of the V and integral support bars joined by rounded bends to opposite ends of the respective connecting bars and extended generally at right angles with respect to the plane of said V-shaped connecting portion, the rounded bends of two of said connecting portions being disposed in opposed relation to dispose said connecting portions of said two connecting portions in a common plane with the connecting bars arranged in substantially a cruciform relationship, a bolt extended through the opposed rounded bends, the connecting portion of the third frame element being disposed in said common plane in the angle between corresponding connecting bars



of said two frame elements, and a pair of connecting bolts extending through each connecting bar of said third frame element at points spaced longitudinally of such bar and extending through the adjacent connecting bar of said two frame elements to secure the three frame elements together, the relationship of said frame elements bing such that the four support bars of said two frame elements extend generally in the same direction from said common plane to afford chair legs, while the two support bars of said third frame element extend in the other direction from said common plane to afford back supports.

6. In a chair frame, three frame elements each formed from a single metal tube to afford in each frame element a V-shaped connecting portion affording connecting bars joined by a rounded bend at the angle of the V and integral support bars joined by rounded bends to opposite ends of the respective connecting bars and extended generally at right angles with respect to the plane of said V-shaped connecting portion, the rounded bends of two of said connecting portions being disposed in opposed relation to dispose said connecting portions of said two connecting portions in a common plane with the connecting bars arranged in substantially a cruciform relationship, means connecting the opposed rounded bends, the connecting portion of the other frame element being disposed in said common plane in the angle between corresponding connecting bars of said two frame elements, and means connecting each connecting bar of said other frame element at points spaced longitudinally of such bar to the adjacent connecting bar of said two frame elements to secure the three frame elements together, the relationship of said frame elements being such that four of said support bars extend generally in the same direction from said common plane to afford chair legs, while two of said support bars extend in the other direction from said common plane to afford back supports.

7. In a chair frame, three frame elements each formed from a single metal tube to afford in each frame element a V-shaped connecting portion affording connecting bars joined by a rounded bend at the angle of the V and integral support bars joined by rounded bends to opposite ends of the respective connecting bars and extended generally at right angles with respect to the plane of said V-shaped connecting portion, the rounded bends of two of said connecting portions being disposed in opposed relation to dispose said connecting portions of said two connecting portions in a common plane with the connecting bars arranged in substantially a cruciform relationship, a first bolt extended through the opposed rounded bends, the connecting portion of the other frame element being disposed in said common plane in the angle between corresponding connecting bars of said two frame elements, and a pair of connecting bolts extending through each connecting bar of said other frame element at points spaced longitudinally of such bar and extending through the adjacent connecting bar of said two frame elements to secure the three frame elements together, the relationship of said frame elements being such that four of said support bars extend generally in the same direction from said common plane to afford chair legs while two of said support bars extend in the other direction from said common plane to afford back support, and said first bolt being disposed so that the center point thereof is disposed in spaced relation to the line of intersection of

planes that are perpendicular to said common plane and passed through the lines of contact of said third frame element with the bars of said two frame elements.

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