Aug. 13, 1935. L. H. McKEE 2,011,067

TUBULAR METAL CHAIR

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Fig. 1.

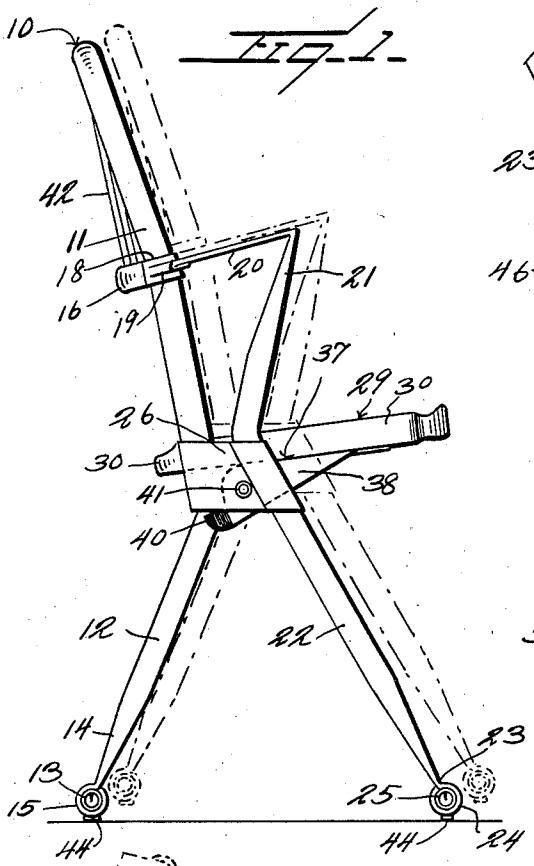


Fig. 5.

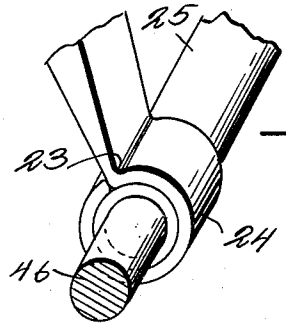


Fig. 3.

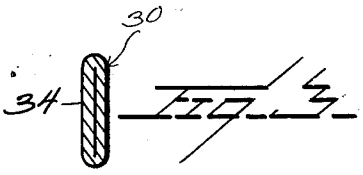


Fig. 4.

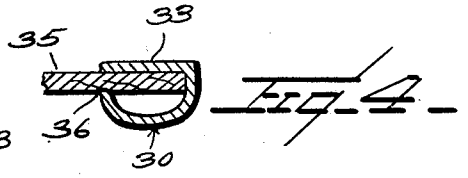


Fig. 2.

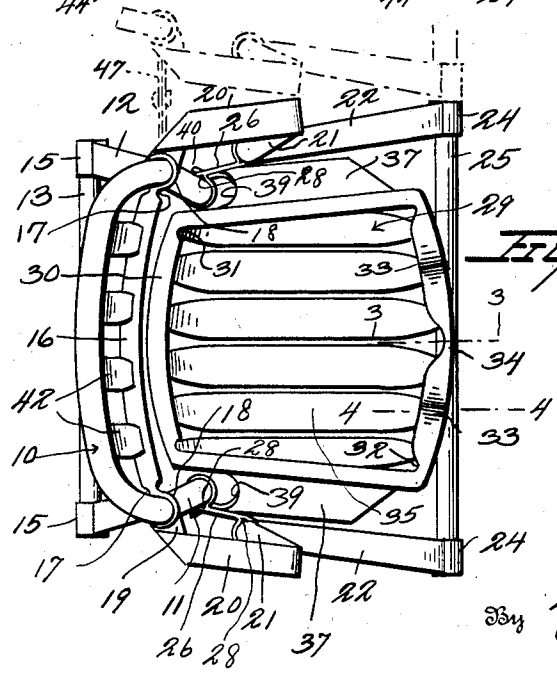
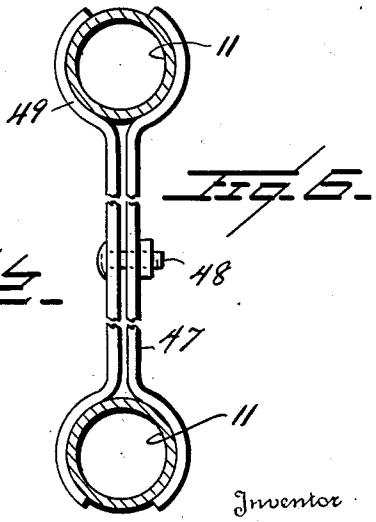


Fig. 6.



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TUBULAR METAL CHAIR

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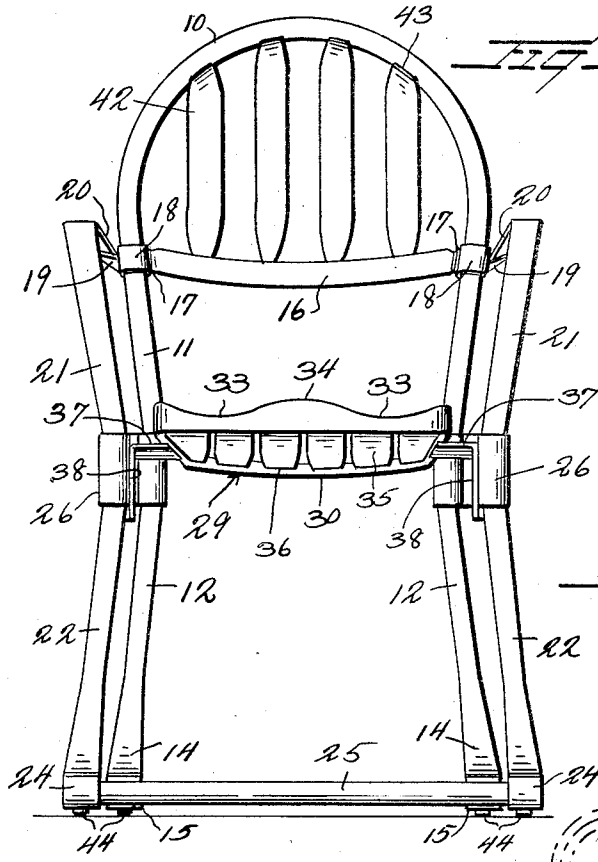


Fig. 7

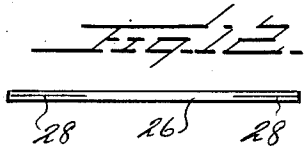


Fig. 12

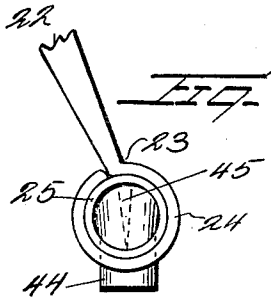


Fig. 9

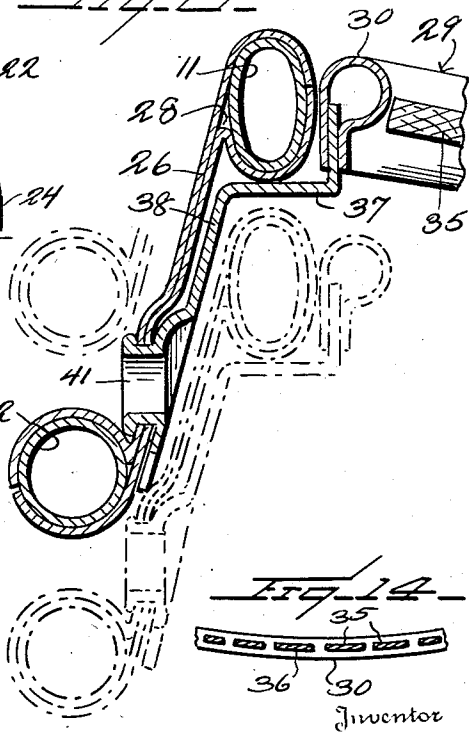


Fig. 8

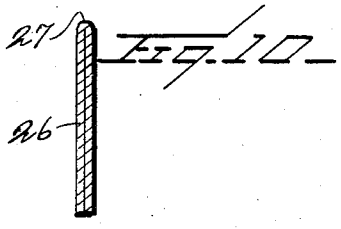


Fig. 10

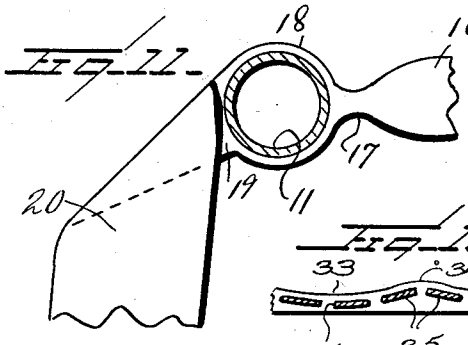


Fig. 11

Fig. 14

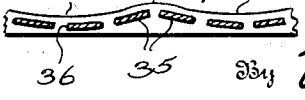


Fig. 13

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UNITED STATES PATENT OFFICE

2,011,067

TUBULAR METAL CHAIR

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Application June 7, 1932, Serial No. 615,880

9 Claims. (Cl. 155—194)

This invention relates to articles of furniture and particularly to a chair made very largely of tubular metal.

The general object of the invention is to provide a chair of this character which is relatively simple in structure and particularly strong and which while capable of use in dwelling houses is particularly designed for use in places of assembly where it is desirable to save space when the chairs are not in use by having one chair fit into or nest within another compactly and neatly or where it is desirable to have one row of chairs fit within and nest within an adjacent row of chairs.

A further object of the invention is to provide a chair having stationary arms or elbow rests which is so designed that it will nest compactly with the next adjoining chairs whether they be single chairs or connected in multiple, thus requiring but a minimum of space within which to store these chairs without the necessity of folding the entire chair and without detracting from a good architectural design by using mechanical devices ordinarily found necessary in folding chairs.

Another object is to provide a chair constructed of tubular metal which will have perfectly smooth and strong joints, the tubes from which the back and front of the chair are formed being connected by braces, each having a double thickness of sheet metal, said braces constituting supporting brackets for the pivoted or liftable seat.

A further object is to provide a chair in which the back and rear legs are formed largely of a single piece of tubing, the lower end of the rear legs being connected by a stretcher and the tubing constituting the upper portion of the back being connected by a transverse back piece also of tubing welded to the back.

A further object is to so form the chair that this back rest before referred to shall be extended to form flat arm rests and then further extended downward to constitute the forward legs of the chair.

Another object is to provide an improved means whereby a metal seat and a metal back may be provided with slats and provide a novel means for engaging these supporting slats with the back and with the seat.

A further object is to provide a novel means for pivotally supporting the seat and bracing the back of the chair from the front legs thereof.

Another object is to provide improved means whereby chairs may be linked together in sets or rows and another object is to provide novel means whereby a resilient buffer may be engaged with the legs of the chair to resiliently support it.

A still further object is to provide a seat and back panel composed of strong and pliable splints or slats of wood so placed as to give resiliency and so formed as to comfortably fit the form of a person using the chair, the ends of these slats being forced in line with curves of a saddle seat by twisting the slats at both ends on entering mortises provided in the correspondingly shaped tubular metal seat frame and further in this connection to add to the flexibility of the slats by narrowing them near their extremities so that the weight of the occupant will cause a slight movement at the joint of each slat.

My invention is illustrated in the accompanying drawings, wherein:—

Figure 1 is a side elevation of a chair constructed in accordance with my invention and showing a nesting chair in Figure 1;

Figure 2 is a top plan view of the structure shown in Figure 1;

Figure 3 is a section on the line 3—3 of Figure 2;

Figure 4 is a section on the line 4—4 of Figure 2;

Figure 5 is a fragmentary detailed view of the lower end of one leg and the spreader connected therewith showing the means for connecting the spreader of one chair with the spreader of another chair, this means being partly in section;

Figure 6 is a horizontal sectional view through a portion of the back of two chairs showing how the two chairs may be connected;

Figure 7 is a front elevation of the chairs shown in Figures 1 and 2;

Figure 8 is a horizontal section of one side of a chair with the seat raised showing in dotted lines the way in which the chairs are nested;

Figure 9 is an end elevation of the lower end of one leg and the spreader therein and showing the manner in which the resilient buffer is mounted within the spreader and leg;

Figure 10 is a vertical section through the connecting web between the front and rear legs of the chair;

Figure 11 is a horizontal section through the rear element of the chair showing the manner in which the back rail is formed and folded to provide an arm rest;

Figure 12 is a top plan view of the brace shown in Figure 10 and showing the slots in the blank;

Figures 13 and 14 are diagrammatic longitudinal sections through the rear and front rails of the seat.

Referring to these drawings, it will be seen that the back of the chair including the rear legs is formed of a single piece of metal tubing designated generally 10. This tubing is bent in an approximate semi-circle so as to form the upper portion of the back of the chair, this upper portion extending straight downward and inward as at 11, then extending downward and rearward as at 12 to constitute the rear legs. The upper portion of the tube 10 above the junction with the rail 16 is circular in cross section. Below the junction with rail 16, however, the portions 11 are oval in cross section, as shown in Figure 8. The legs 12 which are continuous with the portions 10 and 11 are circular in cross section for substantially the entire length of the legs save that at the lower ends these legs 12 are flattened, as at 14.

The legs are slightly divergent with relation to each other, whereas the portions 11 are slightly convergent with relation to each other. The lower ends of the legs are connected by a cross bar or stretcher 13 which may be either tubular or solid. Just above this cross bar, the tube from which the legs are formed is flattened as at 14 and then bent around to form an eye 15 through which the stretcher 13 is disposed and to which this stretcher is welded.

Extending across the back of the chair is the curved back rail 16. This is also formed of tubular material but it is flattened so that it is slightly elliptical in cross section and the two sides are pinched together at 17, then expanded as at 18, and these expanded portions surrounding the tubular member 10 and being welded thereto. In the formation of the joint between the rail 16 and the portion 11, rail 16 is initially longitudinally slitted at diametrically opposite points. The opposed walls defining these slits are then expanded to embrace the member 11 and the metal on each side of this expanded portion, as shown in Figures 7 and 11, is pinched together, as shown at 17 in Figure 11 and 19 in Figure 7, thus causing the contraction of the eye 18 upon the member 11. Beyond these expanded portions 18, the tube is flattened at 19 and then folded or lapped upon itself as at 20, this flattened portion 20 extending above the portion 19 and constituting the arm of the chair. These arms extend outward to any desired extent and the tubular material which forms the curved back rest 16 and the arms is then extended downward and slightly inward as at 21.

The tubular portion is gradually expanded back to its original diameter and then it is extended downward and forward and laterally at 22 to constitute the forward legs of the chair. These forward legs are flattened or pinched together as at 23 and then formed to provide an eye 24 to which a tubular spreader 25 is welded. It will be seen that I have provided the frame of a chair which is formed of two lengths or sections of tubing, these two sections being welded to each other at the points 18.

For the purpose of bracing and supporting the back and front legs against relative movement and in rigid relation to each other, I have provided on each side of the chair a connecting band or web designated 26 which at its ends is folded around the front and rear legs. Preferably this band is formed of two thicknesses of metal and preferably these thicknesses are integral with each other and formed by bending a piece of metal upon the line 27 as shown in Figure 10. The extremities of the metal sheet are slotted at 28 and the ends of the two thicknesses are then bent reversely around the legs 10 and 22. Inasmuch as the legs 22 are disposed laterally outward of the plane of the legs 10, these supporting bands 26 or braces extend forward and laterally outward.

The seat is designated generally 29. This is also formed of a single length of tubular material designated 30 and bent to form the two lateral sides of the seat the rear end of the seat and the forward end of the seat. The rear end of this seat frame 30 is downwardly concave and bowed rearwardly. The two sides of the seat frame are forwardly divergent. The tubular material is pinched together at 31 at the junction of the sides with the rear end of the seat frame.

The forward end of the seat frame is pinched together at 32 at the junction of the sides with the forward end and on each side of the middle of the forward end of the seat frame, the seat frame 30 is pressed downward at 33 and flattened out, the middle of the forward end of the seat frame at 34 being pinched together in a vertical plane and thus the seat frame is thicker at the middle than it is on each side of the middle. This forward element of the seat frame is nearly straight transversely. The inner walls of the front and rear elements of the seat frame 30 are slotted to receive the longitudinally extending slats 35. These slats are somewhat tapered at their ends and inserted in the slots 36. Certain peculiar features of the slats 35 will be hereafter referred to.

Attached to the side elements of the frame 30 are the two laterally disposed supporting wings designated generally 37. These wings extend through slits in the side elements of the seat frame, as shown in Figure 8 and are preferably welded to the side elements of the seat frame and extend horizontally outward and then downward as at 38. The horizontal portion of the wing 37 is longitudinally cut away at 39 to accommodate the tubing of the chair legs. The portion 38 is extended rearward and downward and formed with the rearwardly projecting and outwardly deflected nose or stop 40. The vertical portion of each wing is pivoted at 41 to the corresponding brace 26 by means of an integral struckout portion which extends through the vertical portion of the brace 26 and which is so disposed that when the seat of the chair is in an approximately horizontal position, each nose 40 will engage beneath the edge of the corresponding brace 26 at the junction of this brace with the rear leg. When the seat is in a vertical position, the nose will be approximately in alinement with the corresponding forward leg.

Extending between the back rail 16 or rest and the upper semi-circularly curved portion of the chair back are the vertical slats 42 which are made of wood tapered at their ends and having their ends inserted in the slots 43 formed in the tubing 10 and in the back rest or rail 16.

In order to prevent direct contact of the metal parts of the chair with the floor of a building, the lower end of each front and rear leg is provided with a resilient buffer 44, each eye 15 or 24 formed at the lower end of each leg, and the stretcher 25, if one is used, being apertured to snugly receive the buffer 44 and the buffer 44 is expanded by a wedge 45 disposed in a cleft in the buffer 44 so that when the buffer is driven home, this wedge will be forced in and will act to expand the resilient buffer into the eye 15 or 24 in the manner illustrated in Figure 9 so that this rubber

buffer is permanently engaged with the chair leg.

Another feature of my invention resides in the provision of connecting one chair to another in sections of two or more chairs each, by extending through the tubular stretcher 25 a connecting rail 46, which rail may extend through any number of chair stretchers 25 and thus connect any number of chairs to each other in rows. Furthermore, the chairs may be connected by means of a clip 47 shown in Figure 6 comprising two strips of resilient metal riveted, bolted or otherwise connected to each other at 48 and at their ends having the spring clamping jaws 49 which may engage the rear post of the chair immediately below the arm or elbow rest. This allows the two back legs of each set of chairs to come between the two front legs of the other set of chairs without interfering with the nesting of sectional chairs.

The splints or slats of wood which form the seat and the upper part of the back of the chair are composed of strong and pliable pieces, these slats being placed in the same relative positions as to give resiliency and to conform as closely as possible to the contour of the occupant of the chair. The ends of these slats are forced in line with the curves of the seat frame by twisting at both ends where they enter the mortises or slots provided in the transversely curved tubular metal seat frame. Further to add to their flexibility, these slats are narrowed at their ends so that the weight of the occupant will cause a slight movement at the joint of each slat. Of course, a cushion shaping itself to the flexible "saddle curves" in the seat might be used.

It is to be noted that when the seat is turned upward, the laterally projecting portion of the wings 37 will bear against the vertical tubing of the back at 11 and thus stop the upward movement of the seat and limit the movement of the seat in this direction to a position with the seat in the same plane as the lower portion of the tubular frame 10. Thus two sets of stops are provided, one limiting the movement of the seat to an approximately horizontal position and the other limiting the movement of the seat to its vertical position.

In nesting the chairs, it is obvious that the rear legs of the outer chair will pass between the forward legs of the rear chair with the backs of the two chairs closely approximating each other and with the arms of the outer chair resting upon the arm rests of the rear chair.

It will be clear that in nesting the chairs, each back leg comes up against the back leg of the next adjacent chair and each front leg comes up close to or against the front legs of the adjacent chair and in order to do this, there must be an outward flare given to the arm rests, the arm rest supporting portions, the legs and the wings 37 which support the seat and the connecting or bracing members 26. The wings of the seat fit this flare when the seat is down giving two engaging points one at the side of the rear leg and one under the connecting band or brace 26. When the seat is lifted, the rear ends just escape the rear legs of the forward chair in nesting.

Obviously the forward chair must have its arm rests resting upon the arm rests of the rearward chair. By forming the chair of light tubing of sufficient diameter and weight, it is practicable to add not more than 1¼ inches in thickness for each additional chair in the nested chairs. Thus it will be seen that the chairs may be nested very compactly. As before pointed out, the different elements of the chair frame are welded to each other. Metals cannot be put together with bolts and rivets to withstand incessant racking and strain applied to chairs any better than can wood. However, unless the joints are properly prepared, it is difficult to weld the elements of a chair or other article of furniture together. In my chair, however, this welding is readily secured because of the expanded opening at the joints 18 through which the metal tubing forming the back and rear legs is passed and welded.

The forward and rearward ends of the braces 26 also surround the forward and rear lengths of tubing and may be readily welded thereto and it will be noted that even the stretchers 13 and 28 are enclosed within beads or eyes formed at the lower ends of the legs and thus may be readily welded to the lower ends of the legs. Therefore, in the entire chair, there are no welding uncertainties.

It may be said also that the weight of this tubular metal chair is much less than the weight of wooden Windsor chairs of approximately the same design and the strength and rigidity of the tubing is obviously much greater. The tubing may be made of steel or if great lightness is desired of aluminum. Obviously I do not wish to be limited to any particular metal from which to form the tubing and other parts.

The clip 47 designed to connect adjacent chairs may be disposed either upon the rear posts of adjacent chairs next above arms or next below the arm at the top of the front leg. Obviously these clips may be detachable from the chairs or rigidly connected therewith.

Attention is particularly called to Figures 13 and 14 which are designed to illustrate the fact that the splints or slats 29 are twisted. The rear rail of the chair seat is concavely curved. The front rail of the chair seat has two concavely curved portions as previously described, one on each side of the middle. The rear ends of these slats or splints must follow the curvature of the rear rail, while the forward ends of the slats or splints follow the curves of the forward rail. Thus the rear ends of the splints or slats 29 differ as regards angle to the horizontal from the forward ends of the splints and the splints are, therefore, twisted when they are inserted in the slots in the forward and rear rails and are held in this twisted position.

It will be understood, of course, that the slots or mortises in the tubing of the front and rear rails are spaced apart. Thus the strength of the tubing is not reduced too much and the splints are kept in positive position so that they will not work or rub against each other when in use and so that they are free to change their distance at the ends when bent downward under weight.

It will be seen that I have provided a saddle seat. In upholstered spring seats, the posterior of the user forms a rounded indentation that is too stiff to give to the contour of the user while the saddle seat gives this contour and resiliency and if desired may be made soft with a padded cushion. I am aware of the fact that there are stamped steel saddle seats but they are conductors of heat and cold and wood is not and, therefore, I have provided ventilated seats of wood. Attention is called to the fact that the wing portions 38 are of a single thickness of metal. This saves space in nesting. These wings are particularly important inasmuch as they carry the weight placed on the seat to the pivotal point and it is all that is intervened between

the legs in nesting one chair within another. If instead of this construction, the seat frame itself was pivoted to the front leg, the thickness of the seat would take up too much room when turned upward but with my construction, the seat swings over to a position in the same plane as the downwardly extending portion of the rear frame 10.

It will be seen that I have provided an all-metal chair frame that is very light, very simple, strong and rigid and which is so designed as to nest compactly with adjoining chairs, whether the chairs be single or whether they are connected in series, thus permitting the chairs to be nested within a minimum area without the necessity of folding the entire chair and without the necessity of detracting from a good architectural or mechanical design by using the devices necessary in folding chairs.

While I have illustrated certain details of construction and certain arrangements of parts, it will be understood that these might be varied in some respects without departing from the spirit of the invention as defined in the appended claims.

I claim:—

1. A chair frame formed of continuous lengths of metal tube, one length being formed to provide a horizontal back rail having expanded openings through it, the other length being of substantially inverted U-shape to form a back and rear legs and being extended through said openings and welded to the walls thereof, the length of tubing forming the back rail being extended forward to form chair arms, then extended downward to form supports for the arms and form forward legs in the chair, that portion of the tubing constituting the chair arms being flattened and metallic braces connecting the rear legs and the front legs to each other.

2. A chair frame formed of continuous lengths of metal tube, one length being formed to provide a horizontal back rail having expanded openings through it, the other length being of substantially inverted U-shape to form a back and rear legs and being extended through said openings and welded to the walls thereof, the length of tubing forming the back rail being extended forward to form chair arms, then extended downward to form supports for the arms and form forward legs for the chair, that portion of the tubing constituting the chair arms being flattened, and folded over upon itself at the junction of the arm portions with the said expanded portions and metallic elements connecting the rear legs to the front legs.

3. A chair frame having a back formed of a single length of metal tube bent into a substantially inverted U-shape to constitute a back proper and two rear legs, the legs extending downward and rearward relative to the back, a length of metal tube extending transversely across the back above the legs to form a back rail and welded to the tubing of the back, the second named length of tubing beyond its junction with the back proper being then flattened and extended forward to constitute arms, said arms being flattened, the tubing being then extended downward and rearward toward the upper ends of the rear legs, and then extended downward and forward to form forward legs, and means connecting the front and rear lengths of tubing at the upper ends of the leg portions.

4. A chair frame having a back formed of a single length of metal tube bent into a substantially inverted U-shape to constitute a back proper and two rear legs, the legs extending downward and rearward relative to the back, a length of metal tube extending transversely across the back above the legs to form a back rail and welded to the tubing of the back, the second named length of tubing being then flattened and extended forward to constitute arms, then extended downward and rearward toward the upper ends of the rear legs, and then extended downward and forward to constitute front legs, and braces of sheet metal connecting the front and rear lengths of tubing at the upper ends of said leg portions, said braces being formed to embrace the front and rear tubing and being welded thereto.

5. A chair frame having a back formed of a single length of metal tube bent into a substantially inverted U-shape to constitute a back proper and two legs, the legs extending downward and rearward relative to the back, a length of metal tube extending transversely across the back above the legs to form a back rail and welded to the tubing of the back, the second named length of tubing being then flattened and extended forward to constitute arms, then extended downward and rearward toward the upper ends of the rear legs, and then extended downward and forward to constitute front legs, and braces of sheet metal connecting the front and rear legs, said braces being formed to embrace the front and rear tubing and being welded thereto, and a seat pivotally supported upon said braces for movement into a horizontal plane or into a vertical plane.

6. A chair frame having a back formed of a single length of metal tube bent into a substantially inverted U-shape to constitute a back proper and two legs, the legs extending downward and rearward relative to the back, a length of metal tube extending transversely across the back above the legs to form a back rail and welded to the tubing of the back, the second named length of tubing being then flattened and extended forward to constitute arms, then extended downward and rearward toward the upper ends of the rear legs, and then extended downward and forward to constitute legs, braces of sheet metal connecting the front and rear legs, said braces being formed to embrace the front and rear tubing and being welded thereto and a seat having sheet metal wings extending laterally therefrom and then extended vertically downward, the downwardly extending portions of the wings being pivoted to said braces and the rear extremities of the wings having laterally projecting stops engaging beneath the braces when the seat is in a horizontal position.

7. A chair frame having a back formed of a single length of metal tube bent into a substantially inverted U-shape to constitute a back proper and two legs, the legs extending downward and rearward relative to the back, a length of metal tube extending transversely across the back above the legs to form a back rail and welded to the tubing of the back, the second named length of tubing being then flattened and extended forward to constitute arms, then extended downward and rearward toward the upper ends of the rear legs, and then extended downward and forward to constitute legs, braces of sheet metal connecting the front and rear legs, said braces being formed to embrace the front and rear tubing and being welded thereto and a seat having sheet metal wings extending laterally therefrom and then extended vertically downward, the downwardly extending portions of the wings being pivoted to said

braces and the rear extremities of the wings having laterally projecting stops engaging beneath the braces when the seat is in a horizontal position, the rear ends of the laterally projecting portions of the wings being cut away to accommodate the rear legs and said laterally projecting portions of the wings constituting stops limiting the upward movement of the seat to a vertical position.

8. A chair frame having a back formed of a single length of metal tube bent into a substantially inverted U-shape to constitute a back proper and two legs, the legs extending downward and rearward relative to the back, a length of metal tube extending transversely across the back above the legs to form a back rail and welded to the tubing of the back, the second named length of tubing being then flattened and extended forward to constitute arms, then extended downward and rearward toward the upper ends of the rear legs, and then extended downward and forward to constitute legs, and braces of sheet metal connecting the front and rear legs, each of said braces being formed of a sheet of metal bent longitudinally upon itself and slitted medially to form terminal ends, the terminal ends being bent to embrace the forward and rear tubular members and being welded thereto, and a seat having sheet metal wings formed with vertical portions disposed closely adjacent the braces, and eyelets pivotally connecting the vertical portions of the wings to said braces.

9. An article of furniture having a frame formed of lengths of intersecting metal tubes, one length having an aperture through which the intersecting tube passes, the metal of the apertured tube being longitudinally slitted at diametrically opposite points to form the aperture, the walls on each side of the slit being expanded to receive said intersecting tube, and the metal of the tube on each side of said slit being pinched together to cause the eye thus formed to bind upon the intersecting tube.

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