Dec. 5, 1939. T. D. OWLER 2,182,598

RECLINING CHAIR

Filed May 2, 1938 3 Sheets-Sheet 1

Fig. 1.

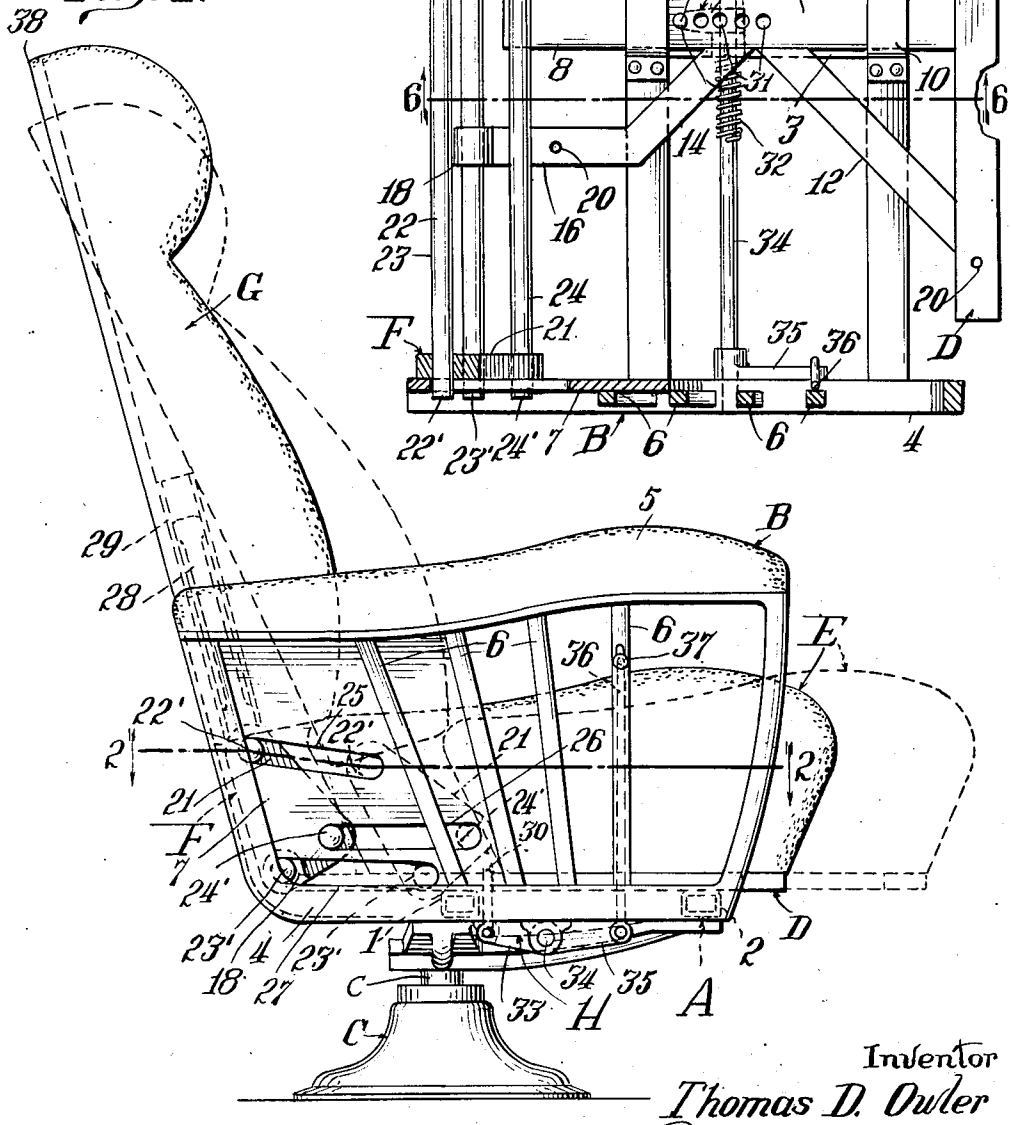


Fig. 2.

Inventor

Thomas D. Owler

By Barnett & Truman

Attorneys

Dec. 5, 1939. T. D. OWLER 2,182,598

RECLINING CHAIR

Filed May 2, 1938 3 Sheets-Sheet 2

Fig. 3.

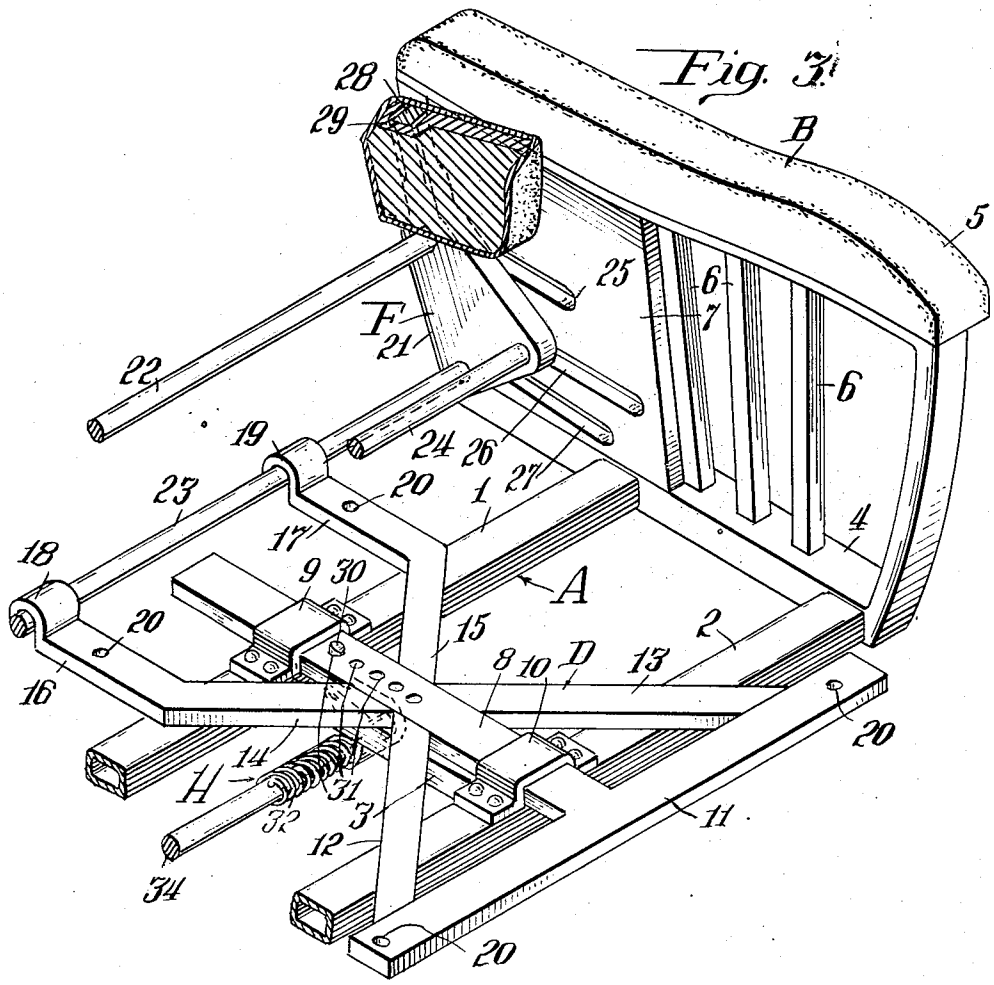
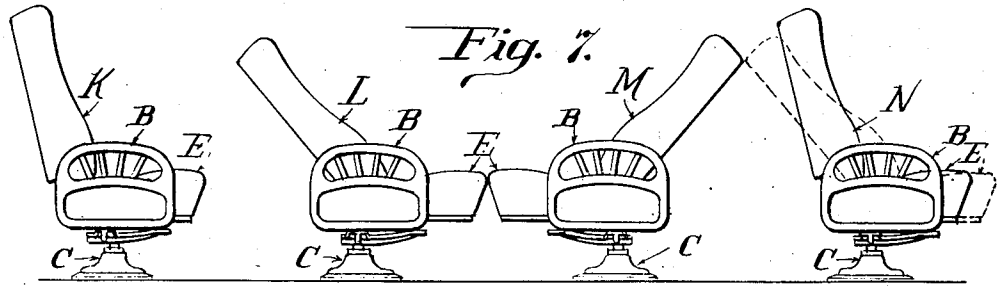


Fig. 7.



Inventor

Thomas D. Owler

By Barnett & Truman

Attorneys

Dec. 5, 1939. T. D. OWLER 2,182,598

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Filed May 2, 1938 3 Sheets-Sheet 3

Fig. 4.

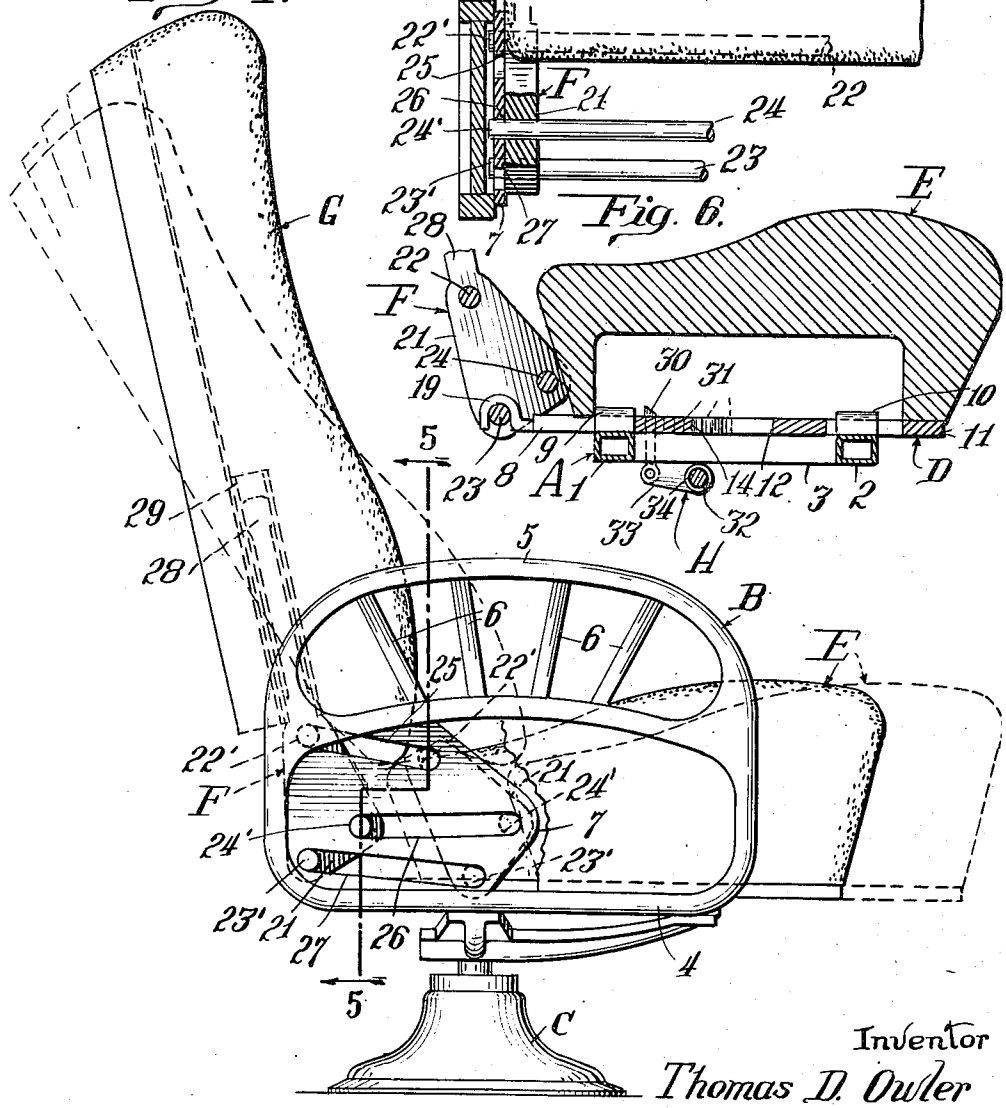


Fig. 5.

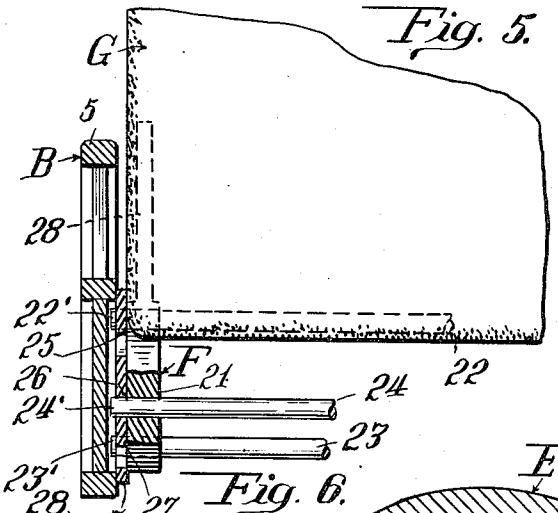


Fig. 6.

Inventor

Thomas D. Owler

By Barnett & Truman

Attorneys

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UNITED STATES PATENT OFFICE

2,182,598

RECLINING CHAIR

Thomas D. Owler, Chicago, Ill., assignor to Coach & Car Equipment Company, Chicago, Ill., a corporation of Illinois

Application May 2, 1938, Serial No. 205,396

6 Claims. (Cl. 155—116)

This invention relates to certain new and useful improvements in a seat or chair of the type especially adapted for use in transportation vehicles, such as railway cars, buses or airplanes, and more particularly to a chair having an adjustable back that may be swung to different inclined positions, preferably in combination with a seat that may be advanced or translated forwardly as the inclination of the back is increased.

In order to provide proper spacing at all times between the chairs, and not to encroach on the space provided for the occupant of the next rearward chair of the series, it is undesirable to have the upper end of the back swing rearwardly too far, if at all, as the back is inclined. This result may be accomplished by providing a supplementary frame in which the back is pivoted adjacent its upper end, or at some position intermediate its length. However, the provision of such supplementary supporting means is undesirable and unsightly and it is preferable to support the back entirely from or adjacent to its lower end. According to the present invention the back is supported entirely by its lower end portion, between the side arm structures, and novel means is provided whereby as the lower end portion of the back is translated forwardly the back will be simultaneously inclined so that the movement permitted the upper end portion of the back may be limited to any extent desired.

Briefly described, the chair comprises a relatively fixed supporting platform and side arm assembly, preferably mounted on a pivotal support of known type so that the chair may be rotated about a vertical axis. The seat is supported on the platform between the side arm structures, and preferably a seat-supporting carriage is provided whereby the seat may be translated forwardly. A second carriage structure is provided in which the lower portion of the back is mounted, and preferably the seat-supporting and back-supporting carriages are so connected that the lower portion of the back will be translated forwardly simultaneously with the seat. Cooperating means are provided on the back-supporting carriage and the relatively fixed supporting frame for permitting a slight rotative movement of the back-supporting carriage as the carriage is translated horizontally so that the inclination of the back will be changed. These interengaging means comprise cooperating spaced apart projections and trackways in which the projections individually engage, the trackways being so inclined relative to one another as to provide the desired swinging movement of the back. Means are provided for locking the seat or back or both in selected positions. Usually this locking means is applied to the seat and since the seat and back are connected for simultaneous movement the one locking means will suffice to hold both in the desired position.

The principal object of this invention is to provide an improved chair or seat of the type briefly described hereinabove and disclosed more in detail in the specification which follows.

Another object is to provide an improved seat and back supporting assembly in a chair.

Another object is to provide improved means for supporting a chair-back entirely from its lower end portion so that it will move substantially as if pivoted about a horizontal axis positioned at any desired level above the actual supporting means.

Other objects and advantages of this invention will be more apparent from the following detailed description of certain approved forms of chairs constructed and operating according to the principles of this invention.

In the accompanying drawings:

Fig. 1 is a side elevation of one approved form of chair.

Fig. 2 is a detail horizontal section taken substantially on the line 2—2 of Fig. 1.

Fig. 3 is a partial perspective view of the operating assembly for supporting the back and seat.

Fig. 4 is a view similar to Fig. 1 showing a slightly modified form of chair providing for a different back movement.

Fig. 5 is a detail vertical section taken substantially on the line 5—5 of Fig. 4.

Fig. 6 is a detail vertical section taken substantially on the line 6—6 of Fig. 2.

Fig. 7 is a side elevation showing a series or assembly of chairs of the type shown in Fig. 4.

The two forms of the chair as shown in Figs. 1 and 4 are substantially identical in operating principles, except for the small distinctions hereinafter brought out although slightly different designs of the arm members are shown in the two figures. The description which follows will apply to either form, except as hereinafter pointed out.

Briefly described, each chair comprises a supporting frame consisting of a lower substantially horizontal platform A and rigidly connected side arm structures B, the entire frame being mounted on a pedestal C for rotation about a central vertical axis as indicated at C. It might here be noted that a pair of similar, independently operating, chairs are often mounted on the same

pedestal C for simultaneous rotation or swinging movement. The supporting pedestal C and the mechanism for supporting the chair or chairs thereon for swinging movement are of well known form and are not here shown in detail. In order to avoid adjacent obstructions, this mechanism is usually so arranged that the chair is actually moved through an irregular orbit as the positions of the chairs are being reversed, but the final result obtained is much the same as if the chairs were swung about a central vertical axis and the chairs will be herein described as if they were so pivoted. A carriage D for supporting the seat E is mounted for substantially horizontal translatory movement on platform A, and a second carriage F which supports the back G is mounted on the supporting frame for both translatory and swinging movement between the two side arm structures B, the carriages D and F being hooked together so that they move substantially simultaneously. A locking mechanism H is provided for holding the seat and back assembly in any desired adjusted position.

The platform A in the form here shown comprises a pair of spaced apart cross beams 1 and 2 rigidly connecting the two side arm structures B, the beams 1 and 2 being centrally connected by a beam 3 at right angles thereto. It will be understood that these so-called beams are preferably in the form of metal castings or angle-bars of any suitable form. The side arm structures B may be of any suitable ornamental design, usually comprising a bottom beam 4 to which the platform is rigidly connected, an upper arm rest 5 and a plurality of suitable uprights 6. The arm-rests 5 may support suitable upholstery if desired. It will be understood that when two or more of the seats are mounted on the same pedestal there may be arms B only at the outer ends of the series, although intermediate arms may be provided if desired. The arms also preferably comprise suitable enclosing portions for concealing guide-plates 7 which support the back-supporting carriage F, all as hereinafter described.

The seat-supporting carriage D rests slidably on platform A and comprises a central longitudinal bar 8 positioned at right angles to the supporting beams 1 and 2 and held slidably in place thereon by the straps 9 and 10, respectively. A front bar 11 is mounted at the forward end of central bar 8 and is also connected with the central portion of bar 8 by the diagonal rearwardly extending bars 12 and 13, which also rest on supporting beam 2. Similar rearwardly extending bars 14 and 15 rest slidably on the rear supporting beam 1 and have rearward extensions 16 and 17 terminating in the hooks 18 and 19, as hereinafter described. This supporting carriage D may be built up of suitable bar members welded together, it being preferable that the upper surface of the carriage be all in one horizontal plane so that the seat E may rest thereon and be bolted or otherwise secured thereto, as indicated for example at the points 20. The seat E may be of any usual and preferred construction.

The back-supporting carriage F comprises a pair of similar upright plates 21, one positioned adjacent each lower side of the back G, the plates usually being of a substantially triangular form and rigidly connected by intervening means so that the plates move as a unit. In the form here shown the plates are connected adjacent the corners thereof by three transversely extending rigid rods 22, 23 and 24. The outer ends of these rods extend through the plates 21 in the form of projections 22', 23' and 24' which engage in the respective slots or trackways 25, 26 and 27 formed in the guide plates 7 rigidly mounted in the side arm structures as already described or on the supporting platform intermediate adjacent seats. While this is a convenient manner of forming the projections it will be understood that these projections may be formed as integral studs on the plates or in any other suitable manner. Rigid plates 28 extend upward from the respective carriage plates 21, these posts engaging in the usual sockets 29 formed in the framework of back G. In this manner the back is easily removable by simply lifting it off of the supporting posts 28. However, the lower portion of the back frame may be fixedly attached to the carriage F if so desired. It will be noted that the back G is supported entirely at its lower end by carriage F, and that it will move with this carriage at all times.

The hooks 18 and 19 of carriage D engage over the transverse rod 23 of carriage F so that as seat E is translated rearwardly or forwardly between the side arms a similar translatory movement will be imparted to the back-supporting carriage F and the lower portion of back G. There is a slight up and down movement of rod 23 as it is translated (due to the inclination of slot 27 as hereinafter described) and the openings in hooks 18 and 19 are of sufficient extent to permit this movement of rod 23. Preferably the upholstered spring portions of the back G and seat E are so designed that the lower portion of the back will slightly overlap the rear portion of the seat at all times, it being remembered that the lower portion of the back and the rear portion of the seat are translated horizontally in unison.

Means are preferably provided for locking the seat and back in any one of a plurality of selected positions. In the form here shown a locking pin 30 is mounted for vertical movement in the central beam 3 of the supporting frame and is adapted to engage interchangeably in any one of a plurality of holes 31 formed in central bar 8 of the seat-supporting frame D. Preferably a spring such as indicated at 32 is adapted to normally urge the bolt 30 to locking position. Bolt 30 is pivotally connected with the outer end of crank arm 33 on the transverse rock shaft 34 pivotally supported at its ends by beams 3 and 4. A second crank arm 35 mounted on the outer end of rock shaft 34 is connected with operating rod 36 extending upwardly within one of the side arm structures and provided with an accessible handle or knob 37 at its upper end. By lifting up on handle 37 the locking bolt may be withdrawn and the seat and back assembly may then be slid to any desired position by the occupant of the chair. Upon releasing handle 37 the spring actuated bolt will be returned to locking position in one of the holes 31 of the seat-supporting carriage.

Referring now more particularly to the form of chair shown in Fig. 1, it is often desirable to permit the back and seat to be moved to a reclining position without having the upper end of the back G swing rearwardly so as to encroach on the space reserved for the occupant of the next rearward seat in the series. It will be noted by comparison of the upright and inclined positions of the back as shown in solid and dotted lines re-

spectively in Fig. 1 that the upper edge 38 of back G moves in a substantially vertical plane without swinging rearwardly at all. This is accomplished by properly inclining, relative to one another, the slots 25, 26 and 27 of plates 7, in which the projections 22', 23' and 24' of the carriage plates 21 engage. The necessary inclination of the slots may be easily determined by plotting a plurality of successive positions of the back (and corresponding positions of projections 22', 23' and 24') as it is moved from the desired upright to reclined positions. It will be apparent that as the carriage F is translated forwardly or rearwardly between the side arms, the projections will move along the relatively inclined slots and impart a slight rotative movement to the carriage F thereby swinging the back G in the desired manner. The back will swing substantially as if pivoted about a horizontal axis adjacent its upper end, although there will be an adidtional lowering movement of this axis which is desirable in order to keep the lower end of the back and the rear end of the seat in close engagement at all times.

Since the guide slots 25, 26 and 27 are positioned so near the lower end of the back G and are so nearly horizontal and parallel in order to secure the desired movement of the back, a single slot would not suffice to hold the back against swinging movement, and if a pair of slots such as 25 and 27 were used with the pins 22' and 23' substantially in line with the back, the back would not be rigid and any looseness at all would permit the back to swing and bind the pins in the slots. The third pin 24' spaced forwardly in triangular relation to pins 22' and 23' and fitting snugly but slidably in slot 26 acts as a stabilizer, since any swinging movement of the back about one pin such as 23' will tend to move pin 24' at substantial right angles to its slot 26 thus holding the back rigidly without any objectionable binding of the pins in their respective guide slots to prevent sliding of said pins.

It is sometimes desirable to permit the upper end of the back G to swing rearwardly to a limited extent as the lower end of the back is moved forwardly, that is the back will swing substantially as if pivoted about a vertically moving horizontal axis intermediate the length of the back, but above the supporting means. The chair shown in Figs. 4 and 7 is designed to operate in this manner. This form of chair differs from the one shown in Fig. 1 only in the relative inclination of the guide slots 25, 26 and 27, and it will be apparent that by properly inclining these slots any desired swinging movement can be imparted to the back G.

An example of the use of a chair of the form shown in Fig. 4 is illustrated in Fig. 7. The chairs indicated at K, L, M and N are four chairs of a longitudinal series of similar equally spaced chairs positioned along one side of a railway car. The chairs K and N are indicated in the normal upright position. In order to form a series of beds or couches, alternate chairs are reversed, or swung through angles of 180°, as indicated by the position of chair M. The chairs are so designed and spaced apart that when the opposed seats E of chairs L and M are translated toward one another into substantial engagement, the back G of each chair will swing rearwardly just half the distance toward the back of the next adjacent chair, as illustrated by the position of the inclined back of chair M in engagement with the correspondingly inclined back of chair N as shown in dotted lines. In this way all of the available space is utilized.

It will be understood that the positions of the pins and slots might be reversed, that is the pins or projections might be mounted on plates 7 of the side arm structures and the corresponding slots 25, 26 and 27 might be provided in the carriage plates 21.

It will be noted that the chair back is supported entirely at its lower end and there are no unsightly brackets or frames projecting above the lower supporting assembly, although the back moves much as if it were pivoted or supported on an axis located far above the supporting means, or even adjacent the upper end of the back.

I claim:

1. In a chair, a supporting frame, a back supported entirely at its lower end, and supporting plates to which the lower end portion of the back is secured, said plates having a plurality of spaced apart projections, and cooperating supporting plates fixed to the frame and provided with trackways in which the projections engage, the trackways being so inclined relative to one another that the inclination of the back with respect to the horizontal will be changed in a predetermined manner as the lower portion of the back is translated substantially horizontally on the frame.

2. In a chair, a supporting frame comprising a substantially horizontal platform, a seat mounted on the platform for substantially horizontal rearward and forward translatory movement, a back, means connecting the seat and lower portion of the back so that adjacent portions of the back and seat will move together, means for locking the seat and back assembly to the frame in selected positions, supporting plates to which the lower portion of the back is secured, each of said plates having three projections spaced apart to form the apexes of a triangle and cooperating plates mounted on the supporting frame, the latter plates being provided with trackways in which the projections slidably engage, the trackways being so inclined relative to one another that the inclination of the back with respect to the vertical will be changed in a predetermined manner as the lower portion of the back is translated horizontally.

3. In a chair, a relatively fixed supporting frame comprising a substantially horizontal platform, and a back and seat supporting assembly comprising a seat-supporting carriage guided for translatory movement on the platform, a back-supporting carriage on which the lower end portion of the back is mounted to move with the carriage, means connecting the carriages for simultaneous substantially horizontal translatory movement, means for locking one of the carriages in selected positions, and pairs of substantially parallel plates carried by the back-supporting carriage and the supporting frame respectively, one of said plates of each pair being provided with three projections spaced apart to form the apexes of a triangle and the other with cooperating trackways in which the projections slidably engage, the trackways being so inclined relative to one another that the inclination of the back will be changed as the back-supporting carriage and lower end of the back are translated horizontally.

4. In a chair, a supporting frame comprising a relatively fixed substantially horizontal platform and side-arm structures rising from the respective sides thereof, and a back and seat supporting assembly comprising a seat-supporting car-

riage guided for translatory movement on the platform between the side-arms, a back supporting carriage on which the lower end portion of the back is mounted to move with the carriage, means connecting the carriages for simultaneous substantially horizontal translatory movement between the side-arms, means for locking one of the carriages in selected positions, and pairs of substantially parallel plates carried respectively by the back-supporting carriage and the supporting frame within the side-arm structures, one of said plates of each pair being provided with three projections spaced apart to form the apexes of a triangle and the other with cooperating trackways in which the projections slidably engage, the trackways being so inclined relative to one another that the inclination of the back will be changed as the back-supporting carriage and lower end of the back are translated horizontally between the side-arms.

5. In a chair, a supporting frame comprising a relatively fixed substantially horizontal supporting platform, and a back and seat supporting assembly comprising a seat-supporting carriage guided for translatory movement on the platform, a back-supporting carriage on which the lower end portion of the back is mounted to move with the carriage, means connecting the carriages for simultaneous substantially horizontal translatory movement, means for locking one of the carriages in selected positions, the back-supporting carriage comprising a pair of substantially parallel plates vertically positioned adjacent opposite sides of the lower portion of the back, means rigidly connecting said plates, and three outwardly extending projections on each of said plates, said projections being spaced to form the apexes of a triangle, and a second pair of vertically positioned plates located adjacent the outer sides of the first-mentioned plates and fixedly carried by the supporting frame, said second plates being provided with separate trackways, one for each projection, the trackways being so inclined relative to one another that the inclination of the carriage and the back supported thereby will be changed as the carriage and lower end of the back are translated horizontally.

6. In a chair, a supporting frame, a back supported entirely at its lower end, and pairs of substantially parallel plates carried by the back and supporting frame respectively, one of said plates of each pair being provided with three projections spaced apart to form the apexes of a triangle and the other with cooperating trackways in which the projections slidably engage, the trackways being so inclined relative to one another that the inclination of the back will be changed as the lower portion of the back is translated substantially horizontally on the frame.

THOMAS D. OWLER.