

July 3, 1945.

S. DUKE

2,379,566

FOLDING WHEEL CHAIR

Filed May 27, 1943

4 Sheets-Sheet 1

FIG. 2.

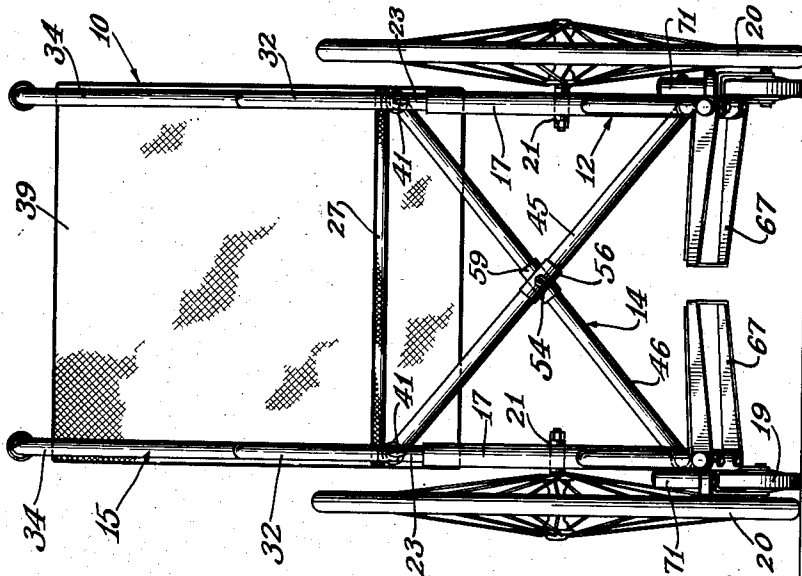
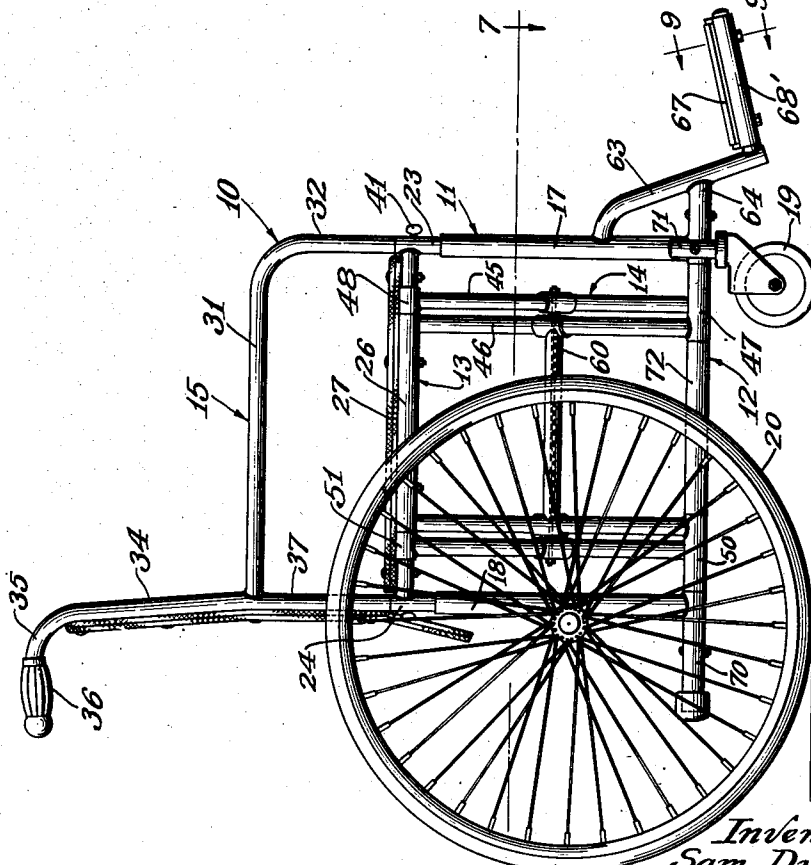


FIG. 1.



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FIG. 4.

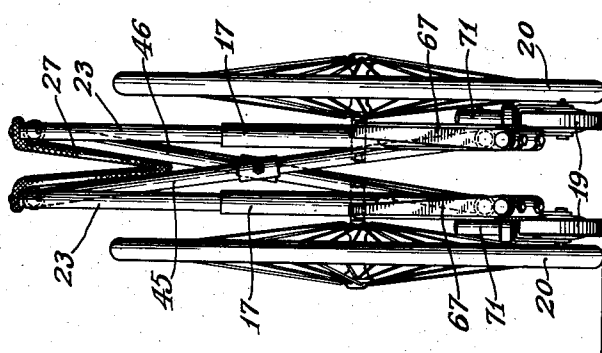
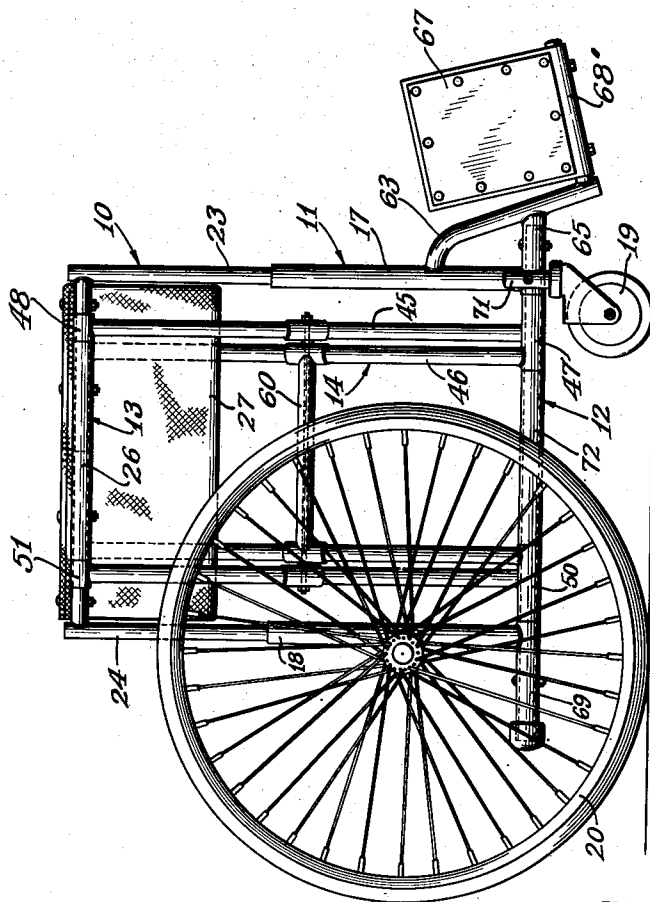


FIG. 3.



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FIG. 5.

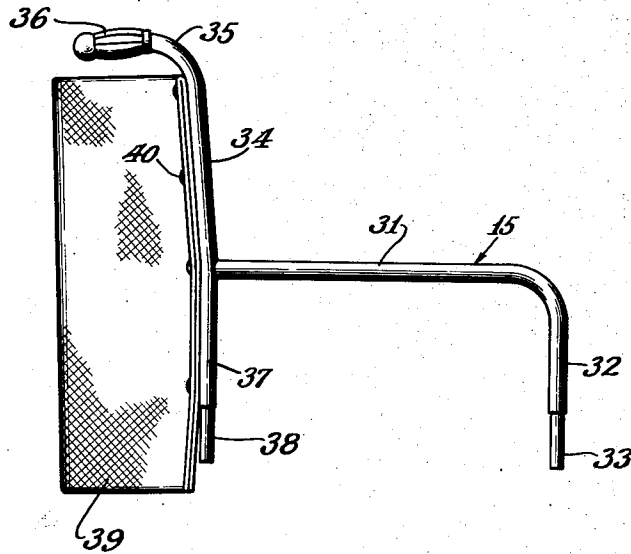


FIG. 6.

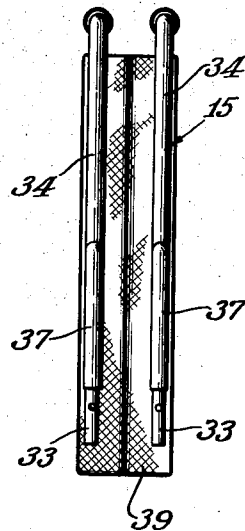
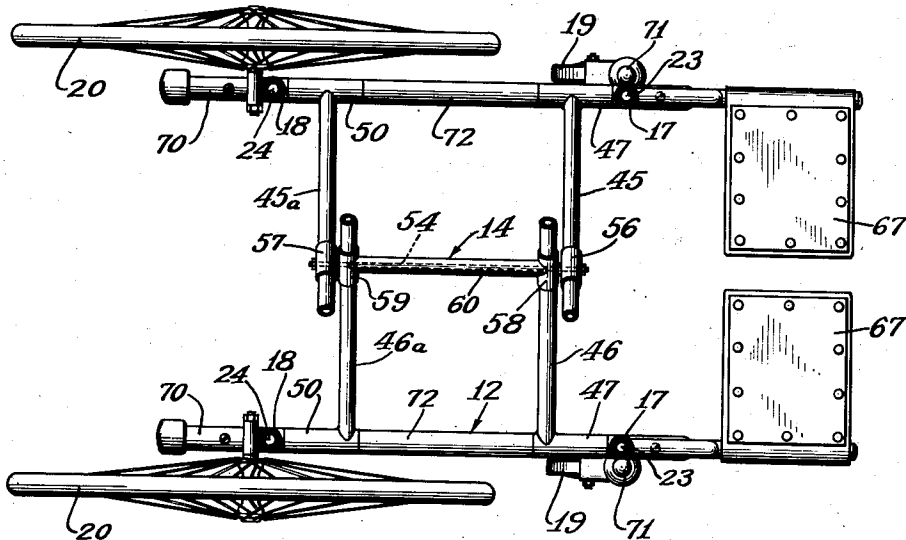


FIG. 7.



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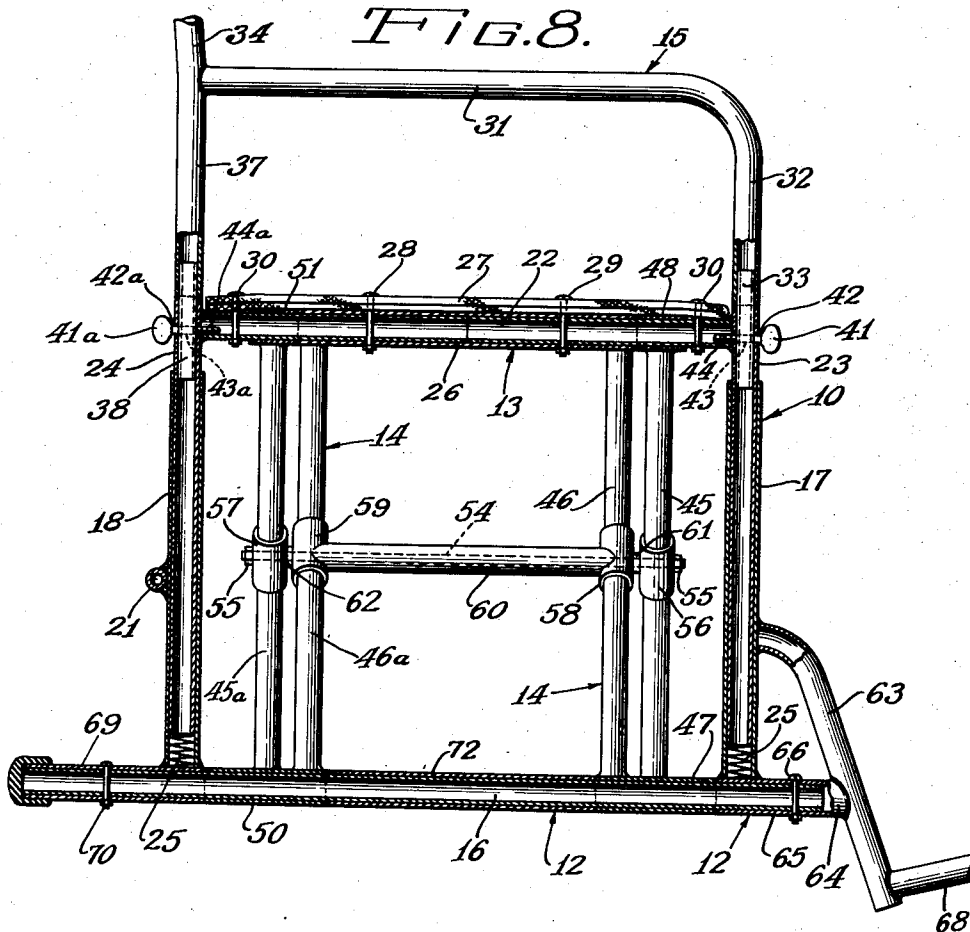
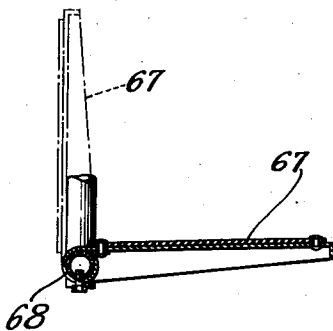


FIG. 9.



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UNITED STATES PATENT OFFICE

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FOLDING WHEEL CHAIR

Sam Duke, Chicago, Ill.

Application May 27, 1943, Serial No. 488,643

13 Claims. (Cl. 155—30)

This invention relates to a folding wheel chair.

More particularly, this invention relates to a folding wheel chair of the type or character intended for use by invalids in homes, hospitals, and like places, as well as for limited outside use upon sidewalks and other relatively flat hard surfaces.

An object of the invention is to provide a new and improved and relatively simple but strong and efficient folding wheel chair which may be readily folded and stored or transported in a relatively small space such, for example, as in the rear seat compartment or trunk of an automobile in railway baggage cars, and like places, as and when necessary.

A further object of the invention is to construct and arrange the new folding wheel chair in such a manner that the seat-supporting unit embodied therein is yieldably mounted upon the wheel-bearing undercarriage embodied in the new folding wheel chair whereby the chair readily lends itself to comfortable riding by the occupant thereof.

An additional object of the invention is to construct and arrange the new folding wheel chair in such a manner as to secure in a novel manner and by novel means a limited amount or degree of flexibility enabling it to move readily over relatively small obstructions upon sidewalks or like comparatively flat places on which it may be operated.

An additional object of the invention is to provide in the new folding wheel chair a novel mounting of the seat-supporting unit upon the wheel-bearing undercarriage of the new folding wheel chair.

Still another object of the invention is to provide a novel bracing unit for bracing the seat-supporting unit of the new folding wheel chair.

A further object of the invention is to provide in the new folding wheel chair a novel combination arm rest and back rest unit which may be detachably mounted upon the seat-supporting unit of the new folding wheel chair in such a manner that the said combination arm rest and back rest unit may be readily detached from the seat-supporting unit to enable the chair to be readily placed, when folded, in a relatively small space such, for example, as in the trunk or back seat compartment of an automobile, or like space, either for the purpose of transporting or storing the new folding chair.

Another object of the invention is to provide a novel operative connection between the lower vertically extending front and rear leg sections and the upper vertically extending front and rear leg

sections to enable and facilitate movement of these parts relative to each other, during movement of the operating parts of the new folding chair from its normal or open and extended and effective position into folded position, as well as during movement of the said operating parts from the folded position into open and extended and effective position.

An additional object of the present invention is to construct and arrange the wheel-bearing undercarriage and the seat-supporting unit and the bracing unit for the seat-supporting unit of the new folding wheel chair in such a manner and relative to each other so that the new folding chair possesses a limited amount or degree of flexibility or racking movement enabling the driving wheels thereof always to remain in tractional engagement with the supporting surface over which they are traveling and notwithstanding irregularities in said supporting surface which one of the driving wheels may encounter.

Still another object of the present invention is to provide novel means in the new folding wheel chair for affording the limited flexibility or racking movement referred to above and the consequent constant tractional engagement of both of the driving wheels with the supporting surface over which they are travelling without employing the unsatisfactory slidable mounting of the tubular sleeves on the lower ends of the tubular diagonally intersecting bracing members and the unsatisfactory loose slidable arrangement of the tubular bracing members on their pivotal mounting, or the loose slidable connection between the horizontally extending seat-supporting bars and the vertical legs of the chair, as employed in certain prior art folding wheel chairs, thereby eliminating the use of such loose slidable connections embodied in said prior art folding wheel chair and which loose slidable connections not only lack structural strength but cause excessive wearing of the parts embodied therein.

Other and further objects of the present invention will be apparent from the following description and claims and will be understood by reference to the accompanying drawings which, by way of illustration, show preferred embodiments and the principles thereof and what I now consider to be the best mode in which I 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 pres-

ent invention and the purview of the appended claims.

In the drawings,

Fig. 1 is a side elevational view of a preferred embodiment of the new folding wheel chair showing the same in open or extended and effective position;

Fig. 2 is a front elevational view of the new folding wheel chair, as shown in Fig. 1, and showing the same in open or extended and effective position;

Fig. 3 is a side elevational view of parts of the new folding wheel chair, showing the same in folded position, and with the combination back rest and arm rest unit removed therefrom;

Fig. 4 is a front elevational view of those parts of the new folding wheel chair in the position in which they are shown in Fig. 3;

Fig. 5 is a side elevational view of the new combination arm rest and back rest unit embodied in the new folding wheel chair and as it appears when removed from the body of the new folding wheel chair and when in folded position;

Fig. 6 is a front elevational view of the new combination arm rest and back rest unit embodied in the new folding wheel chair in the same position in which it is shown in Fig. 5;

Fig. 7 is a sectional top plan view on line 7-7 in Fig. 1 showing the wheel-bearing undercarriage and parts of the seat-supporting and bracing units embodied in the new folding wheel chair, in open or extended and effective position;

Fig. 8 is a fragmentary view, partly in vertical section, and partly in elevation, showing the construction of the seat-supporting unit, and of the wheel-bearing undercarriage, the construction of the bracing unit for the seat-supporting unit, and the novel manner in which the combination arm rest and back rest unit are detachably connected to the seat-supporting unit; and

Fig. 9 is a fragmentary detail view, on line 9-9 in Fig. 1, showing the construction of one of the two foot rest units embodied in the new folding wheel chair.

A typical and preferred embodiment of the new folding wheel chair is shown in the drawings, wherein it is generally indicated at 10, and comprises a supporting frame, generally indicated at 11, and which includes a wheel-bearing undercarriage 12, a seat-supporting unit 13, a diagonal bracing unit 14 for the seat-supporting unit 13, and a combination arm rest and back rest unit 15, all of which parts are constructed and related to each other in a manner which will be described hereinafter.

As shown in the drawings, and particularly in Fig. 8, the wheel-bearing undercarriage 12 comprises a pair of horizontally extending spaced tubular metal bottom runners 16, which extend from the front to the rear of the chair, a short tubular stationary metal sleeve 65 is mounted on the front end portion of each of the horizontally extending tubular bottom runners 16 and is rigidly secured thereto by a suitable fastening element 66 (Fig. 8). Similarly, a short tubular stationary metal sleeve 69 is mounted on the rear end portion of each of the horizontally extending tubular bottom runners 16 and is rigidly secured thereto by a suitable fastening element 70 (Fig. 8).

As shown in the drawings, a tubular metal spacing collar or sleeve 72 is arranged upon the central portion of each of the horizontally extending tubular bottom runners 16 between the rear end of the stationary front sleeve 65 and the front

end of the stationary rear sleeve 69 thereon (Fig. 8).

A vertically extending tubular metal lower front leg section 17 is carried by and is integrally connected at its lower end to each of the short stationary tubular sleeves 65, as by welding or the like, and a vertically extending tubular metal lower rear leg section 18 is carried by and is integrally connected at its lower end to each of the short stationary sleeves 69 (Fig. 8).

A pair of relatively small front caster wheels 19 are swivelly mounted upon the undercarriage 12 of the new folding chair, below the lower tubular front leg sections 17 thereof, and in any suitable manner, as by means of a swivel mounting unit which includes a tubular supporting arm 71 attached to each of the short stationary tubular metal sleeves 65, and a relatively large driving wheel 20 is rotatably journaled in an axle or bearing housing 21 which is carried by and integrally secured to the vertically extending tubular lower rear leg 18 of the wheeled undercarriage 12, and at the rear thereof (Fig. 8).

The seat-supporting unit 13 comprises a pair of spaced horizontally extending tubular metal seat-supporting members or runners 22. Each of these horizontally extending tubular seat-supporting members or runners 22 is integrally connected at its front end, as by welding, to a tubular upper front leg section 23 and each of the horizontally extending tubular seat-supporting members or runners 22 is similarly integrally connected at its rear end to a tubular upper rear section 24 (Fig. 8).

As best shown in Fig. 8, the tubular upper front and rear leg sections 23 and 24 are slidably and telescopically mounted in the somewhat larger tubular lower front and rear leg sections 17 and 18, respectively, and a resilient cushioning member in the form of a metal coil spring 25 is mounted in the lower portion of each of the tubular lower leg sections 17 and 18 and, as shown in Fig. 8, the upper tubular leg sections 23 and 24 bear, at their lower ends, upon the coil springs 25 and are resiliently cushioned thereby.

A stationary tubular metal spacing collar or sleeve 26 surrounds the central portion of each of the horizontally extending tubular seat-supporting members or runners 22 and is rigidly secured thereto by suitable fastening elements 28 and 29. A flexible fabric or cloth seat 27 is attached, at its side edges, by the fastening elements 28 and 29, to each of the horizontally extending tubular seat-supporting members 22 and to the central stationary tubular sleeves 26 carried thereby. As shown in Fig. 8, the front and rear side edge portions of the flexible fabric seat 27 are also attached, as at 30, to the front and rear end portions of the tubular seat-supporting members or runners 22.

The new folding wheel chair includes a novel combination arm rest and back rest unit 15 which is shown in detail in Fig. 5 and which comprises a pair of horizontally extending tubular arm rests 31, each of which has a depending front section 32, and each of these depending front sections 32 has a reduced lower end portion 33. The combination arm rest and back rest unit 15 also includes a pair of upwardly extending tubular back rest supporting posts 34, which are integrally joined to the rear end portions of the horizontally extending arm rests 31. Each of the back rest supporting posts 34 includes a rearwardly extending portion 35 which is provided with a hand grip 36. As also shown in Fig. 5, each of the back rest

supporting posts 34 includes a lower or depending section 37 and each of these lower or depending sections 37 has a reduced lower end portion 38.

As shown in the drawings, and particularly in Figs. 5 and 6, the new folding wheel chair includes a flexible fabric or cloth back rest 39 and this flexible fabric back rest 39 is attached at spaced intervals, as at 40, to the back rest supporting posts 34-37.

The combination arm rest and back rest unit 15 is detachably connected to the vertically extending tubular upper front and rear leg sections 23 and 24 in a manner which is best illustrated in Fig. 8, and which will now be described.

It will be noted in this connection, and as shown in Fig. 8, that when the new folding wheel chair is assembled the reduced lower end portions 33 of the depending front sections 32 of the combination arm rest and back rest unit 15 are telescopically inserted into the upper portions of the vertically extending tubular upper front leg sections 23 of the seat-supporting unit 13. As shown in Fig. 8, the said reduced lower end portions 33 of the depending front sections 32 of the combination arm rest and back rest unit 15 are detachably connected to the upper portions of the tubular upper front leg sections 23 by latching elements in the form of thumb screws 41 which are threaded through suitable threaded openings 42 provided therefor in the tubular upper leg sections 23 and through a corresponding opening 43 provided therefor in each of the reduced lower end portions 33 of the depending front sections 32 of the combination arm rest and back rest unit 15. As is also shown in Fig. 8, each of the thumb screws 41 has an inner end portion 44 which projects into the front end portion of the adjacent horizontally extending tubular seat-supporting member or runner 22, thus effecting a detachable interconnection between the combination arm rest and back rest unit 15 and the tubular upper front leg sections 23 of the seat-supporting unit 13.

A similar arrangement is provided for detachably interconnecting the reduced lower end portions 38 of the depending rear sections 37 of the combination arm rest and back unit 15 with the tubular vertically extending upper rear leg sections 24, this being accomplished by means of latching elements in the form of thumb screws 41a and associated parts 42a, 43a and 44a which are similar to the correspondingly numbered parts 41, 42, 43 and 44, respectively.

The bracing unit 14 embodied in the new folding chair comprises a pair of diagonally intersecting tubular metal front bracing members 45 and 46 and a corresponding pair of diagonally intersecting rear tubular metal bracing members 45a and 46a, respectively. As shown in the drawings, and particularly in Figs. 7 and 8, each of the tubular front bracing members 45 and 46 is provided at its lower end with a tubular metal sleeve 47 and each of these tubular metal sleeves 47 is swiveled upon the front end portion of one of the lower horizontally extending tubular bottom runners 16, between the front end of the adjacent central tubular spacing collar 72 and the rear end of the adjacent tubular front stationary sleeve 65.

Each of the tubular bracing members 45 and 46 is provided at its upper end with a tubular metal sleeve 48 and each of these tubular metal sleeves 48 is swivelly mounted upon one of the tubular horizontally extending seat-supporting members 22, forwardly of the front end of the

central tubular stationary sleeve 26, as best shown in Fig. 8.

Similarly, each of the rear tubular bracing members 45a and 46a is provided at its lower end with a tubular metal sleeve 50 and each of these sleeves 50 is swivelly mounted upon the rear end portion of one of the tubular bottom runners 16, between the rear end of the central stationary spacing collar or sleeve 72 and the front end of the adjacent stationary rear sleeve 69 (Fig. 8).

Each of the rear tubular bracing members 45a and 46a is provided at its upper end with a tubular metal sleeve 51 and each of these sleeves 51 is swivelly mounted upon the rear end portion of one of the horizontally extending tubular seat-supporting members 22 rearwardly of the central stationary spacing collar or sleeve 26.

The four tubular bracing members 45-46-45a-46a are apertured for the passage of, and are interconnected by and pivotally mounted upon a horizontally extending pivot rod 54 which is screw threaded at each end thereof for the reception of a retaining nut, as 55.

It will be noted, in this connection, that the tubular front bracing member 45 is provided with a tubular metal collar 56 which is apertured for the passage of the pivot rod 54 and that the tubular rear bracing member 45a is provided with a similar metal collar 57 which is also apertured for the passage of the pivot rod 54. Likewise, the tubular front bracing member 46 is provided with a tubular metal collar 58 which is apertured for the passage of the pivot rod 54 and the tubular rear bracing member 46a is provided with a tubular sleeve 59 which is also apertured for the passage of the connecting rod 54, the two inner sleeves 58 and 59 being spaced by a tubular spacing collar 60 which is preferably integrally connected at its ends to the tubular collars 58 and 59.

As shown in Fig. 8, the two tubular collars 56 and 58 on the tubular front braces 45 and 46 are separated by a small spacing collar 61 which is carried by the pivot rod 54 and the two collars 57 and 59 on the rear tubular bracing members 45a and 46a and are similarly spaced by a small spacing collar 62 which is carried by the pivot rod 54.

Each of the vertically extending lower tubular front leg sections 17 carries, and has integrally connected thereto, a tubular depending foot rest supporting member 63 and, as shown in Fig. 8, each of these depending tubular foot rest supporting members 63 is integrally connected between its upper and lower ends as at 64, to one of the tubular stationary front sleeves 65.

Each of the tubular foot rest supporting members 63, has a forwardly and slightly upwardly projecting tubular portion 68 integrally connected thereto, and each of these forwardly and upwardly projecting foot rest supporting portions 68 has a foot rest 67 swivelly mounted thereon, by means of a rolled or tubular sleeve 68' carried by each of the foot rests 67.

The new folding wheel chair is shown in open or extended position in Figs. 1 and 2 and in which position it will be noted that the reduced lower end portions 33 of the depending front sections 32 of the combination arm rest and back rest unit 15 are telescopically inserted in the vertically extending upper front leg sections 23, and are detachably connected to said upper front leg sections 23 by means of the latch elements or thumb screws 41 and their inwardly projecting end portions 44. Similarly, the reduced lower end portions 38 of the back rest posts 34-37 are telescopically inserted into the upper portions of the

vertically extending tubular upper rear leg sections 24, and are detachably connected to said tubular upper rear leg sections 24 by the thumb screws or latch elements 41a and their inwardly projecting end portions 44a.

It will also be noted that when the parts of the new folding wheel chair are assembled in open and extended or position of use, as in Figs. 1 and 2, the upper vertically extending rear leg sections 23 and 24, respectively, ride upon and are cushioned by the resilient cushioning members or coil springs 25 which are mounted in the lower portions of the vertically extending lower front and rear leg sections 17 and 18, respectively, so that the combination seat-supporting unit 13, and the combination arm rest and back rest unit 15, which is detachably carried thereby, are effectively cushioned by this arrangement which thus provides easy and comfortable riding for the occupant of the new folding chair seated upon the flexible fabric seat 27. This feature is of particular significance by reason of the fact that the users of the new folding wheel chair are invalids to whom comfort and easy riding is essential during the long hours many of such persons are required to spend in their wheel chairs.

Another feature of the new folding or collapsible wheel chair is that the aforesaid cushioned mounting of the seat-supporting unit 13 and of the combination arm rest and back rest unit 15, detachably carried thereby, relative to the wheel-bearing undercarriage 12, affords a certain degree of flexibility and yieldability between or among the several structural units embodied in the new folding wheel chair, including the wheel-bearing undercarriage 12, the seat-supporting unit 13, the bracing unit 14 for the seat-supporting unit 13, and the combination back and arm rest unit 15, and this yieldability or flexibility facilitates movement of the new folding wheel chair over and relative to comparatively slight obstructions which the chair may encounter in use as, for example, when being moved along a sidewalk or over like comparatively hard flat surfaces.

When it is desired to fold the new folding wheel chair, this may be readily done by pivoting the foot supports 67 into raised position, and then exerting slight upward lift upon the arm rests 31, so as to raise the wheels 19 and 20 slightly and thus reduce frictional drag of the wheels 19 and 20 upon the floor or like supporting surface, and then manually pressing the sides of the chair together, whereupon the tubular sleeves 48 and 51 carried upon the upper end portions of the diagonally intersecting tubular bracing members 45, 46, 45a and 46a will swivel upon the horizontally extending tubular seat-supporting members 22 and the tubular sleeves 47 and 50 carried upon the lower end portions of the diagonally intersecting tubular bracing members 45, 46, 45a and 46a will swivel upon the horizontally extending bottom runners 16 and the said tubular bracing members 45, 46, 45a and 46a and the tubular collars 56—58—57 and 59 carried thereby will pivot upon the horizontally extending pivot rod 54, thus enabling the folding of the new folding wheel chair from its normal open or extended position, as in Figs. 1 and 2, into folded position as in Figs. 3 and 4.

It will be noted that when the new folding wheel chair is moved from its open or extended and effective position, as in Figs. 1 and 2, into collapsed or folded position as in Figs. 3 and 4, the vertically extending tubular upper front and rear leg sections 23 and 24, respectively, ride upwardly in the vertically extending tubular lower front

and rear leg sections 17 and 18, respectively, in which they are slidably and telescopically mounted, and carry with them the horizontally extending tubular seat-supporting members 22 and the flexible fabric seat 27, as well as the combination arm rest and back rest unit 15 if the said combination arm rest and back rest unit 15 is in position of use and has not been detached from the body of the chair prior to the folding operation. This increases the overall vertical height of the new folding chair, as may be seen by comparing Figs. 3 and 4 with Figs. 1 and 2 of the drawings. However, if the combination arm rest and back rest unit 15 has been removed from the body of the chair, prior to the folding operation, the overall vertical height of the chair, when in folded position as in Figs. 3 and 4, will still be maintained or confined within such limits as will enable it to be readily packed and carried in a relatively limited space as, for example, in the trunk or rear seat compartment of an automobile, or in a railway baggage car, as well as enabling the chair to be stored in folded condition in a limited stationary storage space.

When it is desired to open or extend the new folding chair from folded position, as in Figs. 3 and 4, into its normal or open and extended position, as in Figs. 1 and 2, this may be readily accomplished by exerting a slight upward lift upon the arm rests 31 so as to reduce frictional drag of the wheels 19 and 20 upon their supporting surface, while at the same time exerting an outward pull thereon, whereupon the tubular bracing members 45—46—46a—45a, and the tubular sleeves 47—48—50 and 51 carried thereby, will swivel as aforesaid, thus enabling the structural parts of the new folding chair to move into open or extended position, as in Figs. 1 and 2. The foot rests 67 may then be pivoted downwardly into their normal and effective position as in Figs. 1 and 2.

When the chair is in folded or collapsed position, as in Figs. 3 and 4, the flexible fabric seat 27, assumes a position, as shown in Figs. 3 and 4, between the upper end portions of the tubular bracing members 45—46—45a and 46a and the flexible fabric back rest 39 folds upon itself rearwardly of the back rest-supporting posts 34—37.

It will be understood, in this connection, that while the new folding chair has been shown in Figs. 3 and 4 with the combination arm rest and back rest unit 15 removed, the folding and unfolding operations, described above, nevertheless are applicable to the movable or operating parts of the chair and to their relative positions as shown in Figs. 1 and 2 and in Figs. 3 and 4 since the new folding chair may be folded and unfolded or extended either with the combination arm rest and back rest unit 15 in position of use or detached from the body of the chair.

When it is desired to pack or transport the new folding wheel chair as, for example, in the trunk or back seat compartment of an automobile, this may be facilitated by removing the combination arm rest and back rest unit 15, and this is accomplished by removing the manually operable latching elements or thumb screws 41 and 41a, whereupon the reduced lower end portions 33 and 38 of the combination arm rest and back rest unit 15 may be lifted up out of the upper portions of the vertically extending upper front and rear leg sections 23 and 24, respectively, and the combination arm rest and back rest unit 15 thus detached from the body of the new folding wheel chair. This materially shortens the

overall height of the new folding chair, as may be seen by comparing Figs. 3 and 4 with Figs. 1 and 2, and this facilitates the placing of the folded chair in a relatively small space or place as, for example, in the trunk or back seat compartment of the automobile, thereby facilitating transportation of the new folding wheel chair.

It will be noted that the tubular sleeves 47 and 50 carried upon the lower end portions of the tubular bracing members 45-46-45a and 46a, and the tubular sleeves 48 and 51 carried upon the upper ends of the tubular bracing members 45-46-45a and 46a, are incapable of any appreciable sliding movement upon or relative to the horizontally extending bottom runners 16 or upon or relative to the horizontally extending seat-supporting members 22, and that the tubular bracing members 45-46-45a and 46a are likewise incapable of any appreciable sliding movement upon or relative to their pivotal mounting at 54.

One advantageous result of this is that the new folding wheel chair is free from the loose slidable mounting of the tubular sleeve, carried upon the lower ends of the tubular diagonally intersecting bracing members, upon the horizontally extending bottom runners, while also being free from the loose slidable arrangement of the diagonally intersecting tubular bracing members upon their pivotal mounting or connection, as employed in certain prior folding wheel chairs, thereby not only eliminating the structural weakness of such loose slidable connections but also eliminating the excessive wearing of the parts caused thereby.

It will be noted, in this connection, that while the loose slidable connections referred to above, and the aforesaid and other undesirable characteristics thereof, are eliminated therefrom in the new folding wheel chair, the new folding wheel chair nevertheless possesses a sufficient flexibility or racking movement, due to the novel resilient mounting of the seat-supporting unit 13 and the vertically extending upper leg sections 23 and 24 upon and relative to the wheel-bearing undercarriage 12 and the vertically extending lower leg sections 17 and 18 to enable the new folding wheel chair to flex or rack when one of the driving wheels 20 engages an irregularity in the supporting surface over which the chair is travelling so as to maintain both of the driving wheels 20 in constant tractional or frictional engagement with the supporting surface over which the new folding wheel chair is travelling. This is especially desirable because of the fact that folding wheel chairs of the character to which the present invention relates are frequently self-propelled by the occupant thereof rotating the large driving wheels, as 20, and if the frame construction of the chair were rigid and incapable of any flexing or racking this would cause one of the large driving wheels to lose tractional or frictional engagement with the supporting surface over which the chair is travelling if said one large driving wheel should encounter a depression or irregularity in said supporting surface since such a rigid frame construction would cause the bottom surface of said one large driving wheel to remain in the same horizontal plane with the other large driving wheel and prevent it from racking or dipping down into such an irregularity. Hence, the result of this would be that the said one large driving wheel lose tractional or frictional engagement with the supporting surface over which the chair is travelling and the chair would exhibit a tendency to turn in a circle and thus prevent the oc-

cupant thereof from propelling himself or herself forwardly. However, as pointed out hereinbefore, this difficulty is effectively prevented in the new folding chair by the resilient or yieldable and slidable mounting or suspension of the wheel-bearing undercarriage 12 upon the seat-supporting unit 13 through the medium of the telescopically interconnected vertically extending tubular lower and upper front and rear leg sections 13-23 and 18-24 and the springs 25 and associated parts.

It will also be noted that the novel telescopic connection between the lower tubular front leg sections 17 and the upper tubular front leg sections 23 and between the lower tubular rear leg sections 18 and the upper rear leg sections 24 not only eliminates the unsatisfactory loose slidable connections between the horizontally extending seat-supporting members and the vertically extending legs of the chair heretofore employed in certain prior folding wheel chairs but eliminates the substantial wear and weakening of the parts caused by such loose slidable connections heretofore employed.

While the typical embodiment of the folding wheel chair shown in the drawings is primarily an inside chair, and therefore has the relatively large driving wheels 20 located at the rear of the chair, and the relatively small caster or pilot wheels 19 located at the front of the chair, it is, as is well understood in the art, possible to reverse this arrangement by having the relatively large driving wheels 20 located at the front of the chair, and the relatively small caster or pilot wheels 19 located at the rear of the chair as is the preferred arrangement when the chair is primarily designed for outside use. It will be understood, however, as is also well known in the art, that for inside use it is preferred to have the relatively large or driving wheels 20 located at the rear of the chair since this arrangement enables the occupant of the chair to move the front of the chair closer to a desk, bed, or other article, without encountering interference from or obstruction by the large drive wheels which might otherwise occur if the said relatively large drive wheels were arranged at the front of the chair, as is the preferred arrangement when the chair is designed primarily for outside use.

It will also be understood that while the invention has been shown herein as embodied in a folding wheel chair certain of the novel features of the invention, including the wheel-bearing undercarriage 12 and the seat-supporting unit 13, may also be applied to other folding wheel-bearing vehicles such, for example, as folding baby buggies and the like.

It will thus be seen from the foregoing description, considered in conjunction with the accompanying drawings, that the present invention accomplishes its intended objects, and has the desirable advantages and characteristics, including those hereinbefore specifically pointed out, and others which are inherent in the invention.

I claim:

1. A folding wheel chair comprising a wheel-bearing undercarriage including spaced horizontally extending bottom members and vertically extending front and rear tubular lower leg sections carried by each of the said horizontally extending bottom members, a resilient cushioning member arranged in the bottom portion of each of the said vertically extending tubular front and rear lower leg sections, a seat-supporting unit including spaced horizontally extending seat-sup-

porting members and vertically extending front and rear tubular upper leg sections rigidly connected to the said horizontally extending seat-supporting members, said vertically extending front and rear tubular upper leg sections being slidably and telescopically connected to the said tubular vertically extending front and rear lower leg sections and resting at their lower ends upon the said resilient cushioning members, and a bracing unit including a pair of diagonally intersecting bracing members swivelly mounted at their lower ends upon the said horizontally extending bottom members and swivelly mounted at their upper ends upon the said horizontally extending seat-supporting members.

2. A folding wheel chair as defined in claim 1 in which the said resilient cushioning members have the form of coil springs.

3. A folding wheel chair comprising a wheel-bearing undercarriage including spaced horizontally extending bottom members and vertically extending front and rear tubular lower leg sections carried by each of the said horizontally extending bottom members, a seat-supporting unit including spaced horizontally extending seat-supporting members and vertically extending tubular front and rear upper leg sections rigidly connected to the said horizontally extending seat-supporting members and slidably and telescopically connected to the said tubular vertically extending front and rear lower leg sections, a bracing unit including a pair of diagonally intersecting bracing members swivelly mounted at their lower ends upon the said horizontally extending bottom members and swivelly mounted at their upper ends upon the said horizontally extending seat-supporting members, a combination back rest and arm rest unit detachably connected to the said seat-supporting unit and including portions slidably and telescopically connected to the said tubular front and rear upper leg sections and means for detachably interconnecting the said combination arm rest and back rest unit to the said seat-supporting unit including latch elements extending through the said tubular front and rear upper leg sections and through the said portions of the said combination arm rest and back rest unit slidably and telescopically connected thereto into the front and rear end portions of the said tubular horizontally extending seat-supporting members.

4. A folding wheel chair as defined in claim 3 in which the said latch elements are manually operable screw-threaded members.

5. A folding wheel chair comprising a wheel-bearing undercarriage including spaced horizontally extending bottom members and vertically extending front and rear lower leg sections carried by each of the said horizontally extending bottom members, a seat-supporting unit including spaced horizontally extending seat-supporting members and vertically extending front and rear upper leg sections rigidly connected to the said horizontally extending seat-supporting members and slidably connected to the said vertically extending front and rear lower leg sections, a bracing unit including a pair of diagonally intersecting bracing members swivelly mounted at their lower ends upon the said horizontally extending bottom members and swivelly mounted at their upper ends upon the said horizontally extending seat-supporting members, said folding wheel chair including a combination arm rest and back rest unit, and means for detachably interconnecting the said combination arm rest and

back rest unit with the said vertically extending front and rear upper leg sections.

6. A folding wheel chair comprising a wheel-bearing undercarriage including spaced horizontally extending bottom members and vertically extending tubular front and rear lower leg sections carried by each of the said horizontally extending bottom members, a seat-supporting unit including spaced horizontally extending seat-supporting members and vertically extending tubular front and rear upper leg sections rigidly connected to the said horizontally extending seat-supporting members and slidably and telescopically connected to the said vertically extending front and rear tubular lower leg sections, a bracing unit including a pair of diagonally intersecting bracing members swivelly mounted at their lower ends upon the said horizontally extending bottom members and swivelly mounted at their upper ends upon the said horizontally extending seat-supporting members, said folding wheel chair including a combination arm rest and back rest unit including vertically extending front and rear posts, and the said vertically extending front and rear posts of the said combination arm rest and back rest unit having reduced lower end portions telescopically receivable in the upper end portions of the said tubular front and rear upper leg sections, and means for detachably interconnecting the said reduced lower end portions of the said front and rear posts of the said combination arm rest and back rest unit to the said tubular upper front and rear leg sections.

7. A folding wheel chair comprising a wheel-bearing undercarriage including spaced horizontally extending bottom members and vertically extending tubular front and rear lower leg sections carried by each of the said horizontally extending bottom members, a seat-supporting unit including spaced horizontally extending seat-supporting members and vertically extending tubular front and rear upper leg sections rigidly connected to the said horizontally extending seat-supporting members and slidably and telescopically connected to the said vertically extending front and rear tubular lower leg sections, a bracing unit including a pair of diagonally intersecting bracing members swivelly mounted at their lower ends upon the said horizontally extending bottom members and swivelly mounted at their upper ends upon the said horizontally extending seat-supporting members, said folding wheel chair including a combination arm rest and back rest unit including vertically extending front and rear posts, and the said vertically extending front and rear posts of the said combination arm rest and back rest unit having reduced lower end portions telescopically receivable in the upper end portions of the said tubular front and rear upper leg sections, and means for detachably interconnecting the said reduced lower end portions of the said front and rear posts of the said combination arm rest and back rest unit to the said tubular upper front and rear leg sections, said means for detachably interconnecting the said reduced lower end portions of the said front and rear posts of the said combination arm rest and back rest unit to the said tubular upper front and rear leg sections including manually operable elements projected through openings provided in the said tubular front and rear upper leg sections and through the said reduced lower end portions of the said front and back posts of the said combination arm rest and back rest unit into the front and rear end portions of the said tubular

horizontally extending seat-supporting members.

8. A folding wheel chair or like wheel-bearing vehicle comprising a wheel-bearing undercarriage including spaced horizontally extending tubular bottom runners and vertically extending tubular front and rear lower leg sections carried by each of the said tubular horizontally extending bottom runners, a seat-supporting unit including spaced horizontally extending tubular seat-supporting members and vertically extending tubular front and rear upper leg sections rigidly connected to the said tubular horizontally extending seat-supporting members and slidably and telescopically interconnected with the said vertically extending tubular front and rear lower leg sections, two pairs of spaced tubular diagonally intersecting bracing members extending between the said horizontally extending tubular bottom runners and the said horizontally extending tubular seat-supporting members, each of the said tubular bracing members having a tubular sleeve at its lower end swivelly mounted upon one of the said horizontally extending tubular bottom runners and having at its upper end a tubular sleeve swivelly mounted upon one of the horizontally extending tubular seat-supporting members, one of the said two pairs of diagonally intersecting tubular bracing members extending between the front portions of the said horizontally extending tubular bottom runners and the front portions of the said horizontally extending tubular seat-supporting members and the other pair of said diagonally intersecting tubular bracing members extending between the rear portions of the said horizontally extending tubular bottom runners and the rear portions of the said horizontally extending tubular seat-supporting members, and means interconnecting the said two pairs of diagonally intersecting tubular bracing members including a horizontally extending pivot member extending through all of the aforesaid four tubular bracing members and having all four of the said tubular bracing members pivotally mounted thereon.

9. A folding wheel chair or like wheel-bearing vehicle comprising a wheel-bearing undercarriage including spaced horizontally extending tubular bottom runners and vertically extending tubular front and rear lower leg sections carried by each of the said tubular horizontally extending bottom runners, a seat-supporting unit including spaced horizontally extending tubular seat-supporting members and vertically extending tubular front and rear upper leg sections rigidly connected to the said tubular horizontally extending seat-supporting members and slidably and telescopically interconnected with the said vertically extending tubular front and rear lower leg sections, said folding wheel chair including a tubular combination arm rest and back rest unit including vertically extending tubular front and rear posts having reduced lower end portions telescopically interconnected with the said tubular vertically extending front and rear upper leg sections, and said folding wheel chair including manually operable means for detachably interconnecting the said reduced lower end portions of the said tubular front and rear end posts of the said combination arm rest and back rest unit to the said tubular front and rear upper leg sections.

10. A folding wheel chair or like wheel-bearing vehicle comprising a wheel-bearing undercarriage including spaced horizontally extending tubular bottom runners and vertically extending tubular front and rear lower leg sections carried by each

of the said tubular horizontally extending bottom runners, a seat-supporting unit including spaced horizontally extending tubular seat-supporting members and vertically extending tubular front and rear upper leg sections rigidly connected to the said tubular horizontally extending seat-supporting members and slidably and telescopically interconnected with the said vertically extending tubular front and rear lower leg sections, a pair of spaced tubular diagonally intersecting bracing members extending between the said horizontally extending tubular bottom runners and the said horizontally extending tubular seat-supporting members, each of the said tubular bracing members having a tubular sleeve at its lower end swivelly mounted upon one of the said horizontally extending tubular bottom runners and having at its upper end a tubular sleeve swivelly mounted upon one of the said horizontally extending tubular seat-supporting members, means pivotally interconnecting the said pair of diagonally intersecting tubular bracing members together, said folding wheel chair including a resilient cushioning member arranged in the lower end portion of each of the said front and rear lower leg sections and the lower end portion of each of the said front and rear upper leg sections riding and bearing upon one of the said resilient cushioning members, and said folding wheel chair including means for restraining the said tubular sleeves carried by the said tubular bracing members at the lower ends thereof from longitudinal sliding movement upon and relative to the said horizontally extending tubular bottom runners.

11. A folding wheel chair or like wheel-bearing vehicle comprising a wheel-bearing undercarriage including spaced horizontally extending tubular bottom runners and vertically extending tubular front and rear lower leg sections carried by each of the said tubular horizontally extending bottom runners, a seat-supporting unit including spaced horizontally extending tubular seat-supporting members and vertically extending tubular front and rear upper leg sections rigidly connected to the said tubular horizontally extending seat-supporting members and slidably and telescopically interconnected with the said vertically extending tubular front and rear lower leg sections, a pair of spaced tubular diagonally intersecting bracing members extending between the said horizontally extending tubular bottom runners and the said horizontally extending tubular seat-supporting members, each of the said tubular bracing members having a tubular sleeve at its lower end swivelly mounted upon one of the said horizontally extending tubular bottom runners and having at its upper end a tubular sleeve swivelly mounted upon one of the said horizontally extending tubular seat-supporting members, means pivotally interconnecting the said pair of diagonally intersecting tubular bracing members together, said folding wheel chair including a resilient cushioning member arranged in the lower end portion of each of the said front and rear lower leg sections and the lower end portion of each of the said front and rear upper leg sections riding and bearing upon one of the said resilient cushioning members, said folding wheel chair including means for restraining the said tubular sleeves carried by the said tubular bracing members at the lower ends thereof from longitudinal sliding movement upon and relative to the said horizontally extending tubular bottom runners, and said folding wheel chair including means for restraining the said tubular sleeves

carried by the said tubular bracing members at the upper ends thereof from longitudinal sliding movement upon and relative to the said tubular horizontally extending seat-supporting members.

12. A folding wheel chair or like wheel-bearing vehicle comprising a wheel-bearing undercarriage including spaced horizontally extending tubular bottom runners and vertically extending tubular front and rear lower leg sections carried by each of the said tubular horizontally extending bottom runners, a seat-supporting unit including spaced horizontally extending tubular seat-supporting members and vertically extending tubular front and rear upper leg sections rigidly connected to the said tubular horizontally extending seat-supporting members and slidably and telescopically interconnected with the said vertically extending tubular front and rear lower leg sections, a pair of spaced tubular diagonally intersecting bracing members extending between the said horizontally extending tubular bottom runners and the said horizontally extending tubular seat-supporting members, each of the said tubular bracing members having a tubular sleeve at its lower end swivelly mounted upon one of the said horizontally extending tubular bottom runners and having at its upper end a tubular sleeve swivelly mounted upon one of the said horizontally extending tubular seat-supporting members, means pivotally interconnecting the said pair of diagonally intersecting tubular bracing members together, said folding wheel chair including a resilient cushioning member arranged in the lower end portion of each of the said front and rear lower leg sections and the lower end portions of each of the said front and rear upper leg sections riding and bearing upon one of the said resilient cushioning members, said folding wheel chair including means for restraining the said tubular sleeves carried by the said tubular bracing members at the lower ends thereof from longitudinal sliding movement upon and relative to said horizontally extending tubular bottom runners, said folding wheel chair also including means for restraining the said tubular sleeves carried by the said tubular bracing members at the upper ends thereof from longitudinal sliding movement upon

and relative to the said tubular horizontally extending seat-supporting members, and said folding wheel chair including means for restraining the said diagonally intersecting tubular bracing members against sliding movement relative to each other and upon the said means pivotally interconnecting the said diagonally intersecting tubular bracing members together.

13. A folding wheel chair or like wheel-bearing vehicle comprising a wheel-bearing undercarriage including spaced horizontally extending tubular bottom runners and vertically extending tubular front and rear lower leg sections carried by each of the said tubular horizontally extending bottom runners, a seat-supporting unit including spaced horizontally extending tubular seat-supporting members and vertically extending tubular front and rear upper leg sections rigidly connected to the said tubular horizontally extending seat-supporting members and slidably and telescopically interconnected with the said vertically extending tubular front and rear lower leg sections, a pair of spaced tubular diagonally intersecting bracing members extending between the said horizontally extending tubular bottom runners and the said horizontally extending tubular seat-supporting members, each of the said tubular bracing members having a tubular sleeve at its lower end swivelly mounted upon one of the said horizontally extending tubular bottom runners and having at its upper end a tubular sleeve swivelly mounted upon one of the said horizontally extending tubular seat-supporting members, means pivotally interconnecting the said pair of diagonally intersecting tubular bracing members together, said folding wheel chair including a pair of foot rest units arranged at the front thereof, each of the said foot rest units including a tubular foot rest supporting member having an upper end portion rigidly connected to one of the said vertically extending tubular lower front leg sections, and each of the said foot rest supporting members having a portion between its upper and lower ends rigidly connected to the front end portion of one of the said horizontally extending tubular bottom runners.

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