# United States Patent [19]

**Moroney**

[11] **3,893,708**

[45] **July 8, 1975**


[54] **BEARING ASSEMBLY FOR WHEELCHAIR STRUCTURES**


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[22] Filed: **Feb. 6, 1974**

[21] Appl. No.: **439,873**

[52] **U.S. Cl.** ..... **280/242 WC**; 297/DIG. 4

[51] **Int. Cl.** ..... **B62m 1/14**

[58] **Field of Search** ..... 280/242 WC; 308/290, 291; 297/DIG. 4



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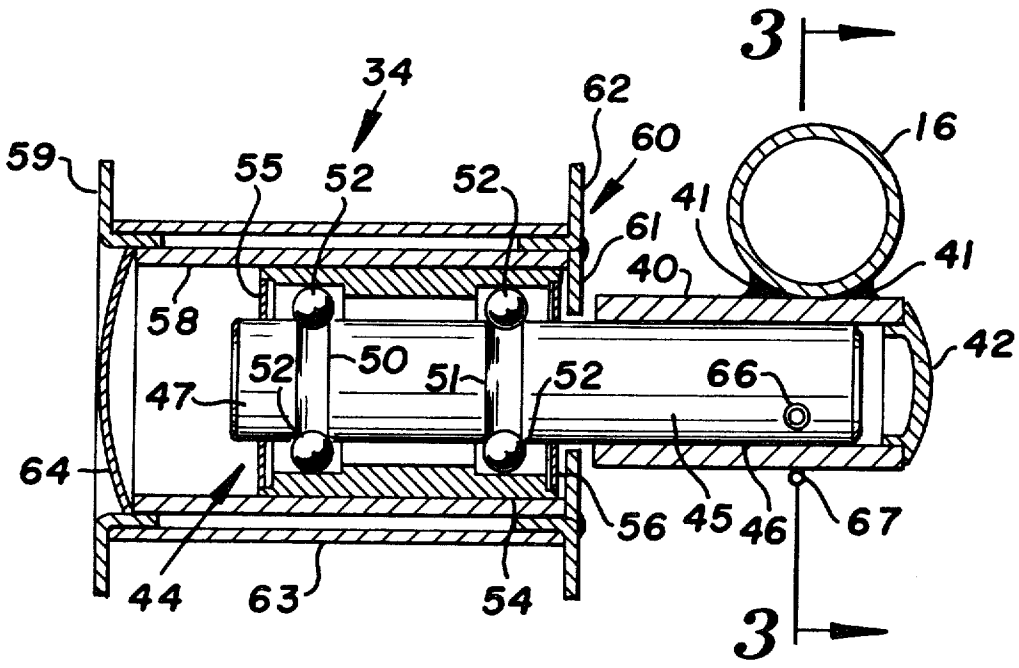
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[57] **ABSTRACT**

A wheel hub and bearing assembly for an invalid supporting wheelchair, wherein the bearing structure includes a pair of axially aligned bearings arranged in side-by-side relationship with a common journal shaft extending therethrough, and with a common outer race being provided for the bearing structure. The elongated journal shaft is received within a sleeve mounted upon the frame means of the wheelchair, and the individual bearing races are disposed in spaced-apart relationship to accommodate shock-loading of the chair structure. For ease of removal of the wheels, the sleeve which receives the journal shaft as well as the journal shaft per se is provided with a generally radially extending pin receiving bore, and a locking bolt or pin is normally received therewithin.


**5 Claims, 3 Drawing Figures**



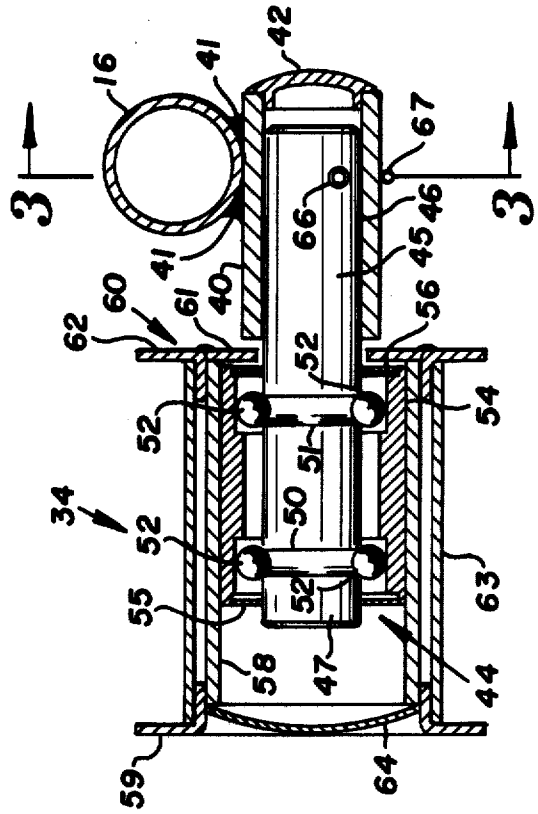



FIG. 2

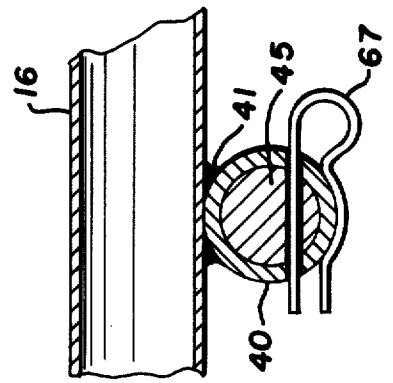



FIG. 3

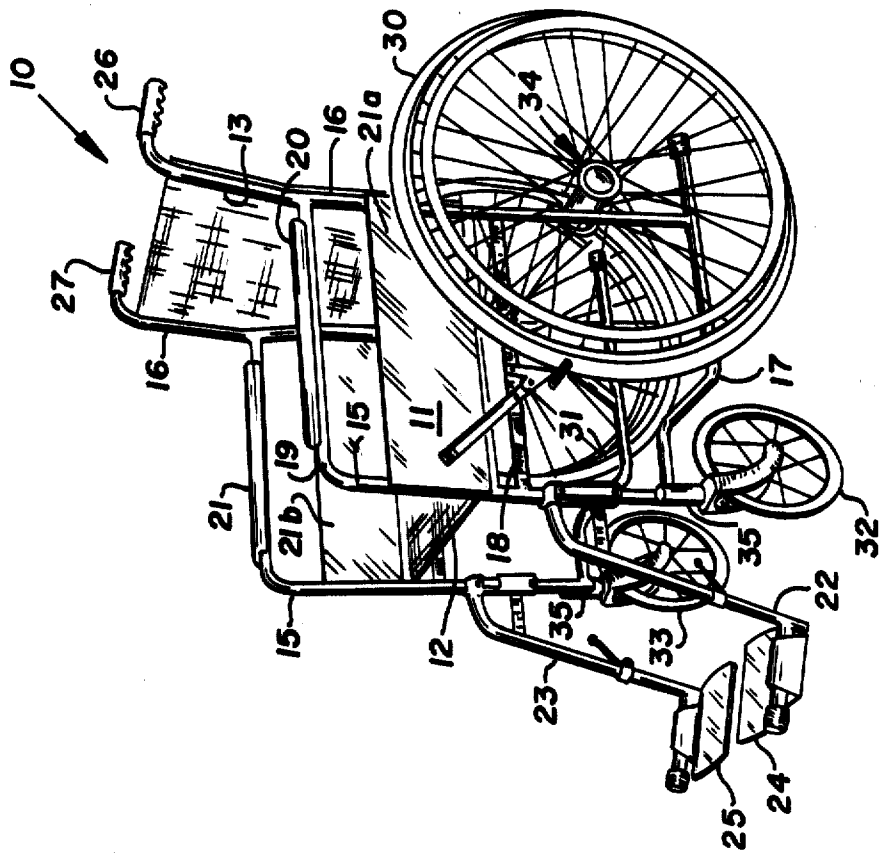



FIG. 1

# BEARING ASSEMBLY FOR WHEELCHAIR STRUCTURES

## BACKGROUND OF THE INVENTION

The present invention relates generally to an improved invalid supporting wheelchair assembly, and more specifically to an improved wheel hub and bearing assembly for such a chair. Essentially, the bearing assembly includes a pair of axially spaced-apart bearing races which are received within a single outer race, with the outer race being normally retained within a central sleeve of a wheel hub assembly. The axial disposition of the bearings, along with the journal shaft provides for stable and durable mounting of the wheels upon the wheelchair structure.

The bearing structures for wheelchairs are frequently subjected to shock-loading, particularly upon the positioning of an invalid within the chair. While the wheelchair is normally not subjected to shock-loading during periods of normal patient support, the shock-loading which occurs when the patient enters the chair is frequently high and unless the bearing assembly is properly designed, damage to the assembly can occur. Obviously, invalids supported in wheelchairs require smooth running of the bearing assemblies in order to avoid problems due to generation of decubitius ulcers along the patient's body and the like. It has been found that durable and smooth-running bearing assemblies render the chairs more comfortable during use for the patients confined to these chairs.

In the past, wheelchair hub and bearing assemblies have normally been provided with either a single roller or needle bearing assembly, or a pair of roller bearing assemblies have been provided at opposed ends of the wheel hubs. While these assemblies have performed reasonably well under normal operating conditions, it has been found that neither has been totally satisfactory from the standpoint of withstanding shock-loading during patient entry into the chair. The wheel hub and bearing assembly of the present invention provides a means whereby shock-loading may be withstood without risking damage to the bearing assembly, and furthermore, the wheel assemblies per se may be detachably secured or coupled to the frame structure of the wheelchair.

## SUMMARY OF THE INVENTION

Briefly, in accordance with the present invention, an improved invalid supporting wheelchair is provided having frame means, seat means supported upon the frame means, and wheels mounted for rotation upon the frame means. The wheels include a central hub which is supported upon a journal and bearing arrangement which includes an elongated journal shaft having the inner end thereof received within a wheel mounting sleeve, and with the outer end thereof having a pair of axially spaced bearing devices mounted thereon. A single outer race is provided radially outwardly of the bearing, with the outer race being rigidly secured within the confines of the wheel hub sleeve. The axial spacing of the bearing races, together with the elongated journal shaft provides a durable wheel hub and bearing assembly which is capable of enduring and withstanding severe shock-loading which occurs when patients are being placed into the chair.

Therefore, it is a primary object of the present invention to provide an improved invalid supporting wheelchair having a durable wheel hub and bearing assembly which includes an elongated journal means having axially spaced bearing means arranged thereon for receipt within the confines of a wheel hub sleeve.



It is a further object of the present invention to provide an improved invalid supporting wheelchair having durable wheel hub and bearing assemblies which are susceptible for use under shock-loading conditions.

Other and further objects of the present invention will become apparent to those skilled in the art upon a study of the following specification, appended claims, and accompanying drawings.

## BRIEF DESCRIPTION OF THE DRAWINGS

FIG. **1** is a perspective view of a wheelchair structure having the improved wheel hub and bearing assembly of the present invention coupled thereto;

FIG. **2** is a vertical sectional view taken generally through the diameter of the journal shaft and bearing assembly supporting the wheels of the chair; and

FIG. **3** is a vertical sectional view taken along the line and in the direction of the arrows **3—3** of FIG. **2.**

## DESCRIPTION OF THE PREFERRED EMBODIMENT

In accordance with the preferred embodiment of the present invention, and as illustrated in FIGS. **1–3** of the drawing, the invalid supporting wheelchair generally designated **10** includes frame means generally designated **11** which receive and retain patient supporting seat means **12** and backrest panel member **13** therewithin. The frame means includes a pair of generally forwardly disposed support posts **15—15,** along with rearwardly disposed support posts as at **16—16.** As is indicated, the frame assembly includes right and left supporting assemblies, with these assemblies being, of course, similar, one to another. Accordingly, the panels include a lower rail element **17,** an intermediate rail **18,** and an upper rail **19.** Arm rest pads are arranged along the upper surface of the upper rail, such as at **20** and **21.** The frame means is preferably collapsible, such as is illustrated in U.S. Pat. No. 2,635,703 and No. 2,824,597. Such collapsible or foldable wheelchair frames are, of course, in wide commercial use at the present time, and accordingly are readily commercially available.

For added stability in the side frames, metal panels are arranged along each side thereof, such as is illustrated at **21A** and **21B,** these metal panels being provided for the purposes of enhancing the rigidity of the structure during normal operational use.

As is further conventional in wheelchair structures, a pair of leg rests are provided such as at **22** and **23,** with these rests terminating in foot support pads **24** and **25.** At the upper end of the frame means, such as at the upper end of rear post **16—16,** a pair of handle grips are provided such as at **26** and **27** for assisting individuals in moving patients confined to the chair.

Also, as is conventional, a pair of main support wheels are provided such as is illustrated at **30** and **31,** along with forwardly disposed castor wheels **32** and **33.** The main wheels **30** and **31** are mounted within wheel hub and bearing assemblies generally designated **34,** to be described more fully hereinafter, while the forwardly disposed castor wheels are journaled within the confines of castor support journals **35—35.** As has been indicated, these assemblies are more fully dis-

closed in U.S. Pat. Nos. 2,635,703 and 2,824,597 referred to hereinabove.

Attention is now directed to FIGS. **2** and **3** of the drawings wherein the details of the wheel hub and bearing assemblies are illustrated. In this connection, the wheel hub and bearing assemblies generally designated **34** which, for purposes of clarity, may be described as wheel receiving spindle means, are mounted upon the frame means and operatively secured thereto. In this connection, a wheel mounting sleeve means **40** is provided, with this sleeve means being secured to post **16** by means of a suitable weld or the like, the fillets of which are illustrated at **41—41**. The inner end of sleeve **40** is provided with a dust sealing cap or the like as at **42**, while the outer axial end of sleeve **40** receives a bearing assembly, generally designated **44**, with a journal shaft **45** being axially received within the confines of sleeve **40**. Journal shaft **45** is fabricated from a durable hardened steel, and has its inner end portion, as at **46**, received within sleeve **40**, with the outer end portion **47** receiving a pair of bearing means therealong. In this connection, a pair of circumferential grooves are provided as at **50** and **51**, these circumferential grooves forming the inner race of a bearing assembly. Bearing means in the form of balls **52—52** are provided, with these balls running within the grooves **50** and **51**, in a conventional fashion. An outer race in the form of sleeve **54** is provided over the bearings **52—52**, with outer race **54** being provided with end seals as at **55** and **56** to assist in the exclusion of dust and debris from the confines of the bearings.

Wheel hub means are provided, with the wheel hub means including a central sleeve **58** having hub flanges **59** and **60** secured to opposed ends thereof. Flange **60** includes a radially inwardly projecting portion **61**, along with a radially outwardly projecting portion **62**. An outer sleeve element **63** is provided to enhance the aesthetics of the assembly. Dust cap **64** is provided which, in combination with flange **61**, further protects the environment from ingress of dust, dirt, and other debris.

As is apparent in the assembly, sleeve **58** is rigidly secured to the outer surface of race **54**, with conventional securing techniques being employed, such as, for example, securing techniques employing curable adhesives, welding, brazing, or the like. Thus, sleeve **58** is fast upon outer race **54**, and will not move relative thereto.

As is apparent in the drawings, the outer bearing means defined by inner race **50** is disposed outwardly of the axial center of wheel hub assembly **34**. Thus, the load is distributed along the length of the journal shaft, thus enabling the system to withstand shock-loading such as is frequently encountered with devices of this type. Also, it will be observed that a substantial portion, approximately one-half, of the axial length of journal shaft **45** is received within the confines of wheel mounting sleeve **40**. This also enhances the durability of the structure.

In order to releasably retain the individual wheel assemblies within the confines of wheel mounting sleeve **40**, a through-bore is formed generally radially within sleeve **40**, such as illustrated at **66**, for receiving locking pin **67** therewithin. Locking pin **67** is preferably prepared from ordinary spring-steel, and when locked in place, will provide for releasable retention of the wheels within the confines of the chair assembly. A mating bore is formed within or along journal shaft **45**, thus making it possible for pin **67** to extend generally radially therethrough. In lieu of a through-bore being formed in journal shaft **45**, a circumferential groove may be provided which will permit pin **67** to be utilized without regard to orientation of the individual bores.

For added purposes of durability, a bearing assembly similar to that illustrated in FIGS. **2** and **3** may be provided in the castor assemblies, such as within the castor sleeve portion **35**. This bearing assembly will be equally durable in such an application.

I claim:

**1.** In an invalid supporting wheelchair having frame means, seat means supported upon said frame means, and wheel receiving spindle means mounted upon said frame means, said wheel receiving spindle means comprising:

a. wheel supporting spindle receiving sleeve means rigidly mounted upon said frame means, a bearing assembly having a journal shaft spindle extending laterally therefrom and having the inner end thereof received within said sleeve means;

b. means arranged along said journal shaft spindle and adjacent the outer end thereof defining a pair of axially spaced inner bearing races;

c. bearing means disposed along said inner races and outer race means disposed radially outwardly of said bearing means and retaining said bearing means radially therewithin, said outer race means comprising a bearing means retaining sleeve with axially spaced outer bearing races;

d. wheel hub means comprising a central spindle receiving sleeve with hub flanges disposed at either end thereof and mounted radially outwardly of said bearing means and receiving said outer race means rigidly therewithin, and arranged to turn with said outer race means;

e. a generally radially extending bore formed within said wheel supporting spindle receiving sleeve means and having releasable locking pin means extending therethrough, and recess means formed along said journal means for receiving said releasable locking pin means therewithin.

**2.** The invalid supporting wheelchair as defined in claim **1** being particularly characterized in that said bearing means are spaced apart and disposed adjacent opposed axial ends of the central sleeve portion of said wheel hub means.

**3.** The invalid supporting wheelchair as defined in claim **1** being particularly characterized in that said bearing means are balls.

**4.** The invalid supporting wheelchair as defined in claim **2** being particularly characterized in that approximately one-half of the axial length of said journal shaft spindle is received within said central sleeve, with the other half being received within said wheel mounting sleeve means.

**5.** The invalid supporting wheelchair as defined in claim **1** being particularly characterized in that said bearing means are provided with radially extending seal elements adjacent the opposed ends of said outer race means.

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