A NOVEL WHEEL CHAIR DESIGN FOR HOSPITALS OR ON ROAD

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Abstract—Wheel chairs are used for transporting physically disabled persons, from one place to other, by the attendant or self propelling mode in hospitals or on road, where movement safety is ensured. The wheel of the chair are larger in diameter (inner side) than the wheel that are used for self propelling (outer side). The gap between these two wheels are less for which the body or cloth worn by the person touches the wheel that roles on the floor, when he keeps his hand on the arm rest of the chair or move with self propelling. Germs on the floor migrated from floor to human body. The present investigation provides protection or cover like wheel guard on the wheel, which could have prevented direct contact with rolling wheel, with person sitting on wheel chair. The infection due to contact of floor dust to the clothing’s of person in wheel chair can be decreased, by two methods. Either by increasing the gap between self propelling wheel and the wheel that rotates in the floor (X-axis, Model No-1) or increase the wheel axel height, of self propelling wheel, above the wheel axel that rotates on the floor (Y-axis, Model No-2), so that suitable wheel guard can be attached to the wheel that moves on the floor. In the present design, care has been made on the wheel mechanism to overcome above deficiencies, keeping in view of manufacturing cost, ease of operation, weight and maintenance angle, Model No-1, which can be affordable by user, is discussed in this paper.

Emphasis has been made To minimize the infection caused due to body contact with rear wheel, which moves over the floor. The rear wheel is suitably designed by (1) providing adequate gap between rear wheel and push ring (x-axis shift), (2) providing a guard cover to rear wheel so that human body/clothing’s do not come in direct contact of rolling wheel (3) The cost , weight, operational strength and maintenance aspects are considered to exist in competitive market.

Keywords—Wheel rim, Welding, Hub, Spoke, Wheel Guard.

Introduction

Wheel chair is a common item is any hospital. A patient /person who is physically unable to move, but can sit, are taken from one place to other by hospital attendant through wheel chair. Physically handicapped(leg) person can also move by self propelling mode in wheel chair. Aged persons who are confined to bed are taken outside for a change, with the wheel chair by their family members.

DESCRIPTION

A general purpose wheel chair consist of a chair mounted over four wheels. Two numbers front wheel (on caster) one for left side and other for right side, are smaller in diameter, fixed on the frame of wheel chair, which can rotate $360^\circ$, whereas other two wheels(rear side), one left and other at right side, are of larger
diameter than front wheel are mounted over the frame of the chair with nut, bolt and bearings. These wheel can move forward and backward direction only.

Each rear wheel consist of outer rim is fixed to the hub through spokes and covered by tyre. The side rim is used for self propelling. To stop the movement of wheel a mechanical braking arrangement is provided through a handle. The wheel chair can also move by pushing it by the attendant through push handle shown in fig1.

The gap between the push ring and rear wheel has also been minimized.

METHODOLOGY
The rear wheel is redesigned to meet its objective. Various parts are fabricated welded and assembled to make the new rear wheel .Its operational movement with load on floor/road worthiness is carried out.

FABRICATION AND ASSEMBLING
In the existing system fig 2 (a)(b) the rim of rear wheel is directly connected to the hub through spokes. The push ring is welded to the rim of rear wheel with separators. The shape and size of separator decides (a)the gap between rear wheel and push ring ,(b)diameter of push ring ,its strength and operational performance.(c)fixing of guard cover over rear wheel .The shape and size of separator is the bottle neck for which gap cannot be increased and guard cover could not be fixed.

The bottlenecks has been taken outmost care in design and fabrication. Another rim(inner) of lower diameter than that of rear wheel rim is placed in between the hub and rear wheel rim concentrically and the hub, inner rim and outer rim are welded through the spoke(fig3a).Another inner rim of equal diameter is welded to push ring in concentric mode through the spoke (fig3b).Both the inner ring are welded with separator.

The difference between the inner rim and outer rim diameter of rear wheel decides the depth and width of the guard cover to be fitted whereas the diameter of inner rim and length of separator decides the strength and rigidity and operational flexibility of the system.

EXPECTED OUTCOME
With the new wheel chair the personal body/clothing contacts of user with rear wheel moving on floor is not there during self propelling. The user gets adequate space for using push ring ,gives flexibility. Hence the chance of infection due to dirt/dust through clothing and hand of user in hospital/road is minimized.

RESULT
The user of wheel chair got more flexibility while using push ring in self propelling mode. The dust guard can be fixed easily which was not possible.
earlier. Hence infectious material of floor/road don’t come in contact with the person. This is possible due to increase gap between rear wheel and push ring. There is no problem as per its operational movement, strength while handled by attendant or self.

END USERS
The patients in hospital, physically (leg) handicapped person, person who do not want to want (tied) can use comfortably.

MARKET AND GLOBAL RELEVANCE
Such product are not available in market. It is based in new design, good aesthetic and cost competitive with other make products. Awareness among users comparing new and old version, their choice/preference is for new version designed by us.

ESTIMATED COST OF THE PRODUCT
The general purpose wheel chair low cost manual mode are available in the market cost of 5000/- approximately. Since in our model little additional fabrication is made the cost is increase to Rs6000/- (Rs1000/-extra). If mass production is made the cost may come down to Rs5500/- (Rs 500/- extra). The intangible benefit one get is more compared to marginal rise in cost is advisable to use new model made by us.

SIMILAR PRODUCT STUDY AVAILABLE IN THE MARKET
Varieties of product available in the market by different manufactures, our target was for general purpose, manual, low cost wheel chair for general public/hospital/home uses which can reduce infectious to the users under self-propelling mode. In this segment to meet the objective no model is found. However battery operated wheel chair which are costly and needs regular attention, used by limited users are excluded from our discussion.

CONCLUSION
With new technology and development of new materials, battery operated, electrical drives with joystick controller wheel chair are available. Which are flexible, comfortable to user. To reduce weight of wheel chair, fiber body parts are replacing steel parts. These system are costly, needs regular maintenance and attention and frequently monitoring for smooth operation for which skill technician are required. Still the low cost general purpose wheel chair are controller are available. Flexible, comfortable to user to reduce weight of wheel chair, fiber body parts are replacing steel parts. These system are costly, needs regular maintenance and attention and frequently monitoring for smooth operation for which skill technician are required. Still the low cost general purpose wheel chair are maximum in use. Our model provides a good solution to reduce health hazards/infections.

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REFERENCE: www.google.com/wheelchair