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Design and Development of Modified Bullock Cart

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Abstract-*Bullock and bullock cart plays an important role in every farm related activity since long history. With the advancement in technology the farming methods and equipment shows the drastic improvement. But there is no any sufficient improvement is carried out in the animal driven carts used in agriculture activities. The conventional design of cart results in animal drudgery while operating, it affects the neck and limbs of the bullock. This results in hampering the efficiency of bullock.*

In this paper an attempt is made to improve the structure and functional ability of bullock cart. The spring damper mechanism is used to reduce the animal drudgery which leads to overall improvement of efficiency of bullock cart with the reduction of effort required to drive the cart.

Keywords: *bullocks, bullock cart, animal drudgery, spring damper mechanism, animal drudgery.*

I. INTRODUCTION

While considering the current oil crisis and inflation ratio, it is become essential to switch over the alternative energy sources, but switching over the new sources is quite expensive. For farmers in India it is not feasible to invest more money for transportation.so that it became necessary to improve the efficiency of existing technology with the complete utilization of resources available.

In the country like India where the large numbers of animals are still serves the purpose of agriculture and transportation.In according to latest survey 15 million carts are still used in ruler India as a main transport vehicle. Out of which 13 million cats ate driven by bullocks.

With the help of many field visits it is found that the present bullock cart is manufactured with very poor technology. Also it is less efficient and suffered from various drawbacks such as animal drudgery and distortion of tissues when loaded excessively.

To contour this problem and to enhance the efficiency of the bullock cart, there is some technological modifications are done in the existing structure of bullock cart with the spring damper mechanism, which will definitely going to improve the efficiency of the cart with reduction in animal drudgery. This research paper illustrates the details about the constructional and functional features of modified bullock cart with its working.

II. BACKGROUND OF THE RESEARCH

In many field visits it is found that the loading of cart is done excessively and at random order. The bullock has to pull that load against the uneven terrains like muddy, slushy, grassy terrain, uphill and downhill conditions. The working conditions are not specified in case of bullock cart.

The current structure of bullock cart is not designed to accommodate this situation easily, so this loading and working condition shows wide impact on the animals driving the cart.

In the working condition of the bullock cart it is seen that, while going downhill the bullock lowers their neck and sometimes they sat down suddenly. This is happens because the shifting of dynamic load on the neck of bullock. And from neck it is transferred to the front limbs. Due to sudden transfer of load on the limb the internal tissues of limb might ruptures and causes internal injury to the bullocks.

Likewise while going uphill the load in the cart shifts in the rear end of the cart. Bullock is fastened to the cart yoke with the harness. While shifting the load, the load tries to tilt the cart about the rear end. That allows the harness to tighten at the neck of bullock. The bullock has to undergo excessive effort against the gravity and tilting of load. That leads to serious breathing problem to the bullocks and sometimes it may cause serious injury to the respiratory track of bullocks.

To resolve these problems of lowering efficiency and to prevent the bullocks from these types of injuries the technological solution is suggested with the proper design of the cart with spring damper mechanism. The research is illustrated in the paper.

III. WHAT IS MODIFIED BULLOCK CART?

The modified bullock cart is the cart with special spring damper mechanism along with some structural modifications in existing structure of cart.

The structural modifications are as-

i) Steel chassis frame with c section bars.
ii) Chassis is distributed into two parts with the help of hinged joint

iii) The two parts of chassis is connected with spring damper mechanism.
iv) The mild steel collar (as open lubrication bearing)
v) The curved end neck yoke.

IV. THE CONCEPT

The concept of development of this type of cart is based upon the shifting of center of gravity of the cart according to the operating condition of the terrain and load.

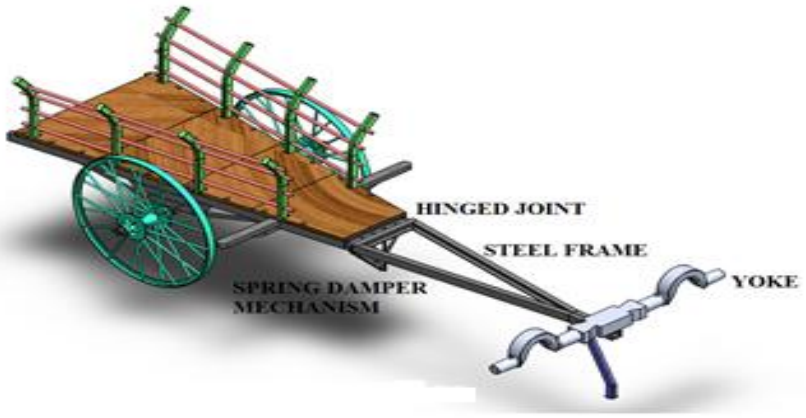

Figure 1. Modified bullock cart

V. CONSTRUCTION

For the proper justification of the concept the design of bullock cart is modified accordingly.
The chassis of bullock cart is made with C section steel bars to reduce the weight of the cart and to provide the sufficient strength and enhance the working life of the cart.

The chassis of bullock cart is divided into two parts and the each part is joined to each other with the help of hinged joint.
The divided parts are supported at hinged joint with the help of spring damper mechanism.
The wheels are mounted on the axel over the mild steel collar made up of soft metal.

VI. WORKING

In this cart the hinged joint allows the both the parts to rotate freely about the joint. For the effective utilization of the cart, this motion is made constrained with the help of spring damper mechanism.
While going uphill the center of gravity of the cart is shifted in the backward detection, and cart tries to tilt around the hinged joint. The tilting force is acting on the spring damper mechanism. Because of the force the spring expands and damper damps the forces within spring damper mechanism. Tilting occurs at sufficient degrees without causing any impact on the front section of cart. Thais results in stable positioning of cart in dynamic loading section with very low effect on animals driving the cart.

Also in the case of downhill motions the center of gravity of the loaded cart is shifts in front direction of cart. The force will allow the cart to tilt in front direction, which results in contraction of spring and the force will be restricted to transmit to the front section of cart. This results in the stable positioning of the cart in dynamic loading condition with slight impact of load on animals driving the cart.

VII. ADVANTAGES OF MODIFIED BULLOCK CART

i) Simple in design
ii) Light in weight
iii) less costly
iv) Can be used in any geographical condition.
v) The efficiency of animal driving the cart is improved with very less drudgery.
vi) It prevents the animal from injury so enhances its working life.
vii) The soft material collar is used in between the wheel hub and axel which leads to reduction in erosion of axel and reduce its failure.
viii) This cart can be operated at high velocity and elevated loading conditions.

ix) The neck yoke allows the more area of contact between the neck and yoke surface, which allow the proper utilization of animal energy to drive the cart.
x) Improved mechanical advantage

VIII. DISADVANTAGE

The modified bullock cart consists of spring damper mechanism, so it needs to undergo proper maintenance on regular basis.

IX. RESULTS

The design of modified bullock cart is analyzed by using different analysis software and the result shows that, less efforts are required to drive the cart and the reduction in animal drudgery along with improvement in mechanical advantage of the cart.

X. CONCLUSION

Considering the structural and functional overview of modified bullock cart it is seen that, the modified bullock cart requires less effort to drive and it is animal friendly, economical with improved efficiency.

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