

CHAPTER 1

INTRODUCTION

In the present scenario, Animal drawn carts especially bullock carts, are the oldest mode of transportation, existing in India and in few other countries since the past unknown. About 15 million bullock carts exist in India. Statistic shows that number of bullock carts has not reduced in last 30 years, belying the popular concept that bullock carts will disappear with the development of society. Reasons are many. The fact is that still in India, bullock carts are the most important mode of transportation in many parts of rural India. Unfortunately, the technology of the carts has not been improved. The conventional bullock carts are made of wooden wheels and bamboo / wooden load carrier (known as platform). More than 80% bullock carts are of conventional type. Only a few number of carts has been partially converted to metallic (which cannot be termed as 'improved'). As this mode of transportation will exist in India, there is need for the improvement of the technology.

Bullock cart is a medium of transportation used in our country from ages; it is used to transport human being as well as materials. Bullock cart are also used as a medium of ploughing in villages and in farm. It takes a lot of time to dump the materials from the bullock cart. To reduce transportation cost materials such as sand, cement bags, sugarcane bagasse are transported using bullock cart.

With the use of mechanical mechanism we tend to ease the dumping produce which intend reduces the work load of the human being. Additionally we introduce the pesticide sprayer to help farmers during forming.

The mechanism used in this multi action bullock cart is,

1) Tilting

The base of the bullock cart is rotated with the help of bevel gears and axle drive mechanism operated by the handle and lever.

2) Lifting

The base of the bullock cart is lifted with the help of universal joint which is connected to lead screw which is operated by rotating the handling.

Materials like sugarcane bagasse, crops, food grains, sand bags and waste materials are unloaded safely using our project. Wooden materials are transported but not unloaded at once unlike other materials. But materials are breakable then we should take more care while unloading.

SIGNIFICANCE OF PROPOSED WORK

- Titriling of the bullock cart tray by handle operating, through bevel gears.
- Lifting of the titled tray by handle operating through lead-screw mechanism.
- Air pressure pumping through cranking mechanism from rotations to convert into to and fro to drive the piston of the air pump to pressurize the air into the air tank which can be later on used for pesticide spraying through pipe and jet.

NEED

- Improved bullock carts will be durable (more than 25 years), which will provide better economy to the farmers or poor people for whom the bullock carts are meant for livelihood.
- As scientifically produced source of energy (fossil fuel) is depletable, use of animal energy should be increased as much as possible.
- It is very sustainable method of communication where road connectivity is poor and time is not a limiting factor.
- It will help to increase agricultural products with minimized loss.
- It is environment friendly, pollution free.
- Fabricated bullock carts will generate rural employment.

Deforestation will be reduced as the improved carts will use steel as the main materials.

Design and fabrication of universal action bullock cart

Bullock carts are one of the earliest and most popular modes of transport in the 19th and early 20th century.

A bullock cart or ox cart is a two-wheeled or four-wheeled vehicle pulled by cattle. It is a means of transportation used since ancient in many parts of the world. They are still used today where modern vehicles are too expensive or the infrastructure does not favour them.



Fig 1: bullock cart

Used especially for carrying goods, the bullock cart is pulled by one or several oxen (bullocks). The cart is attached to a bullock team by a special chain attached to yokes, but a rope may also be used for one or more animals. The driver and any other passengers sit on the front of cart, while load is placed in the back. Traditionally the cargo was usually agrarian goods and lumber.

Traditionally, bulk quantities of agricultural products like paddy were transported using bullock cart. The driver and passengers sat in the front section of the two-wheeled vehicle and goods were placed in the back. Bullock cart were also used for garbage collection in major towns before the Second World War.

The whole world is moving towards new technologies and scientific inventions, but still one can find oldest and traditional mode of transportation across many villages. Some merchants and traveller prefer the bullock cart over other transportation vehicles.

Merchants transport their goods such as bags of cardamom or rice, for farm use the short distances of 25-30kms by bullock cart. It is low cost and seems to be the safest mode of transport despite being slow.

Design and fabrication of universal action bullock cart

During the early civilization man used the animal power in this service. Like some other animals his bullocks carried his loads. In order to draw better service from the bullocks, man invented the bullock-cart.

The body of the cart is about nine feet long and three feet broad. It is mainly a flat frame which is plain in size. It is made of bamboos. These bamboos are fixed side-wise one after another. Wooden rods may be used in place of the bamboos. On both the sides at the middle, two big wheels of wood have been fixed to this frame. At the front, two bullocks are harnessed to the cart. When bullocks draw it, the wheels roll on and the whole structure moves. The passengers cart bears and shed over it. The goods cart bears a long basket upon itself.

The bullock-cart has a lot of advantages over other types of conveyance. The train needs the railway lines. The motor cars and the horse-coaches need plain roads. But the Bullock-cart can move both on the roads and on the out of the way places. The bullock-carts can go to such places to which other sorts of wheeled traffic cannot move. Hence, the transport of goods depends very much on the bullock-carts. The making income-group can possess bullock-carts for themselves.

The bullock-cart is quite slow in its speed. It has to depend upon the patient and bullocks. If the bullocks get tired or sick, the cart cannot work. If the bullocks get unruly on the way, the cart and the cart-man surely run into danger.

In the early days of kampongs in Singapore, bullocks with large fore humps and flapping dewlaps were a common sight and often reared. They powered wheeled vehicles that moved up and down cart tracts that would later develop into proper roads. These large two-wheeled vehicles pulled by a pair of bullocks were often hired as freight haulers. The freight included water, hay, coconuts, pineapples, and simple furniture when people moved. Kieta Ayer, literally meaning “bullock cart water” in Malay, is a road in Chinatown which draws its name from the bullock and ox carts that used to ply this road. Bullock carts were mostly owned by Tamils, and along with trams, buses, rickshaws and horse carriages, they formed the main modes of transport in the early 19th century. Fittings done to the bullocks include placing a wooden platform with a sturdy tongue between the parallel wheels of the cart to create space for passengers or freight. Bullock carts significantly contributed to the early economic development of Singapore as they were used to move goods at Boat Quay and the Port. Domestic life was also relived by

Design and fabrication of universal action bullock cart

bullock carts as they transported water drawn from wells in Ang Siang Hill to the people of different ethnic groups in Chinatown. As the water carts plied the street, the water also helped to keep down dust raised by vehicles. At construction sites, bullock carts were used to transport materials such as bricks. Bullocks were also used in road repairing. A modification of the vehicle, by attaching a lawn at the racecourse in Farrer Park to be maintained by bullocks. Bullock carts that pulled a large metal roller attached to them were used to level grass on the Padang.

Chinese bullock carts: two-wheelers drawn by water buffaloes with large palm leaves attached to them were an equally common sight. They not only carried passengers but also vats of soy sauce and all kinds of liquids to be kampong residents. Water buffaloes could be seen grazing on grassy countryside until the fifties when rising levels of road traffic put an end to the use of bullock carts on Singapore roads. As with rickshaws, bullock carts also began to dwindle with the introduction of mechanized transport in 1867.



Types of cart :

Larger carts may be drawn by animals, such as horses or oxen. They have been in continuous use since the invention of the wheel, in the 4th millennium BC. Carts may be named for the animal that pulls them, such horse-cart or ox-cart. In modern times, horse-carts are used in competition while draft horse showing. A dogcart, however, is usually a cart designed to carry hunting dogs: an open cart with two cross-seats back to back; the dogs could be penned between the rear-facing seat and the back end.

The term “cart”(synonymous in this sense with chair) is also used for various kinds of lightweight, two-wheeled carriages, some of them sprung carts especially those used as open pleasure or sporting vehicles. They could be drawn by a horse, pony or dog.



Examples include:

- Cocking cart: Short bodied, high, two-wheeled, seat for a groom behind the box; for tandem driving.
- Dogcart: light, usually one horse, commonly two-wheeled and high, two transverse seats set back to back.
- Donkey cart: underslung axle, two lengthwise seats; also called pony cart, tub-cart.

Design and fabrication of universal action bullock cart

Carts have many different shapes, but the basic idea of transporting material (or maintaining a collection of materials in a portable fashion) remains. Carts may have a pair of shafts, one along each side of the draught animal that supports the forward-balanced load in the cart. The shafts are supported by saddle on the horse. Alternatively (normally where the animals are oxen or buffalo), the cart may have a single pole between a pair of animals. The draught traces attach to the axle of the vehicle or to the shafts. The traces are to a collar (on horse), to a yoke (on other heavy draught animals) or to a harness on dogs or other light animals.

Traces are made from a range of materials depending on the load and frequency of use. Heavy draught traces are made from iron or steel chain. Lighter traces are often leather and sometimes hemp rope, but plaited horse-hair and other similar decorative materials can be used.

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Advantages

1. The bullock carts are made of steel, mostly welded, so are very rigid.
2. Design and configuration are very simple, so that it is manufactured by rural fabricators easily.
3. Centre of Gravity has been kept very low and on the top of mid-axle to have better balance.
4. Square or rectangular tube sections have been used to provide better load bearing properties to the carts.
5. The carts can be modified to suit any type of use.
6. Mechanism of carts is very simple, so that minimum maintenance is required.
7. Bearings have been provided at wheels to reduce pulling force.
8. Brakes have been provided for smooth movement of carts.
9. Brakes are flexible enough to be operated from front or rear and in combination or in isolation.
11. Metallic wheels are interchangeable with pneumatic wheels with minor modification of carts.
12. Yoke is of bamboo or wood to reduce injury on animal's shoulder caused by over-heating.
13. The carts are aesthetic and may be coloured as per operator's choice.



Fig 1.1: Ton Carrying Capacity Bullock Cart