

CONCEPTUALIZATION OF DUMPING TRAILER AND DESIGN OF GENEVA

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Abstract— we have taken up this project as real challenge, as we have no practical experience in the field. Modern 3 ways dropping dumper' has been conceived by observing the difficulty in unloading the materials. The survey in this regards in several automobile garages, revealed the facts that mostly some difficult methods were adopted in unloading the materials from the trailer.

Keywords—dumping trailer, Geneva.

I. INTRODUCTION

A dumper is a vehicle designed for carrying bulk material. Dumpers are distinguished from dump trucks by configuration: a dumper is usually an open 4-wheeled vehicle with the load skip in front of the driver, while a dump truck has its cab in front of the load. The skip can tip to dump the load; this is where the name "dumper" comes from. They are normally diesel powered. A towing eye is fitted for secondary use as a site tractor. Dumpers with rubber tracks are used in special circumstances and are popular in some countries. Early dumpers had a payload of about a ton and were 2- wheel drive, driving on the front axle and steered at the back wheels. The single cylinder diesel engine (sometimes made by Lister) was started by hand cranking. The steering wheel turned the back wheels, not front. Having neither electrics nor hydraulics there was not much to go wrong. The skip was secured by a catch by the driver's feet. When the catch is released, the skip tips under the weight of its contents at pivot point below, and after being emptied is raised by hand. Modern dumpers have payloads of up to 10000kg and usually steer by articulating at the middle of the chassis.

II. CONCEPT GENERATION

Concept 1: Mechanism without Geneva with jack [3]

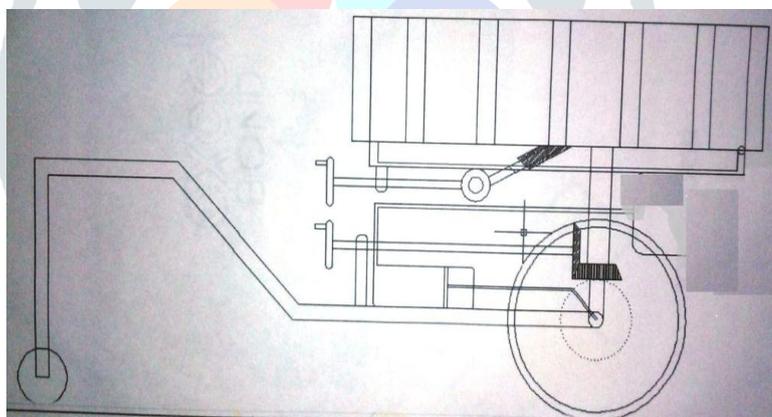


Fig. 1 Mechanism without Geneva with jack

Limitations:-

1. Maintenance increases
2. Increased complexity
3. Difficult lock at a instant
4. Cost increases

Concept 2: Mechanism with Geneva with jack

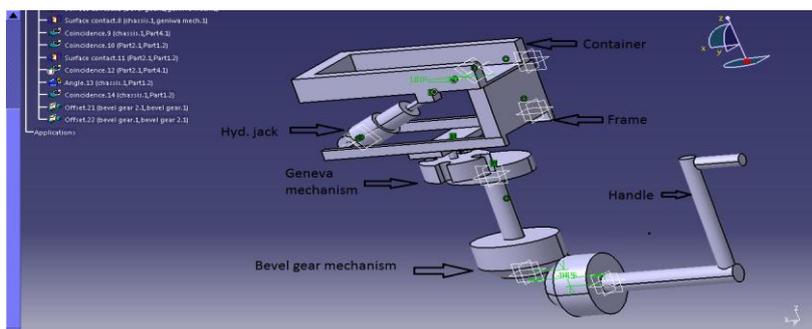


Fig. 2 Mechanism with Geneva with jack

Limitations:-

1. Increased complexity
2. Cost increases
3. Maintenance increases
4. Leakage problem

Concept 3: Mechanism with Geneva with lead screw [3]

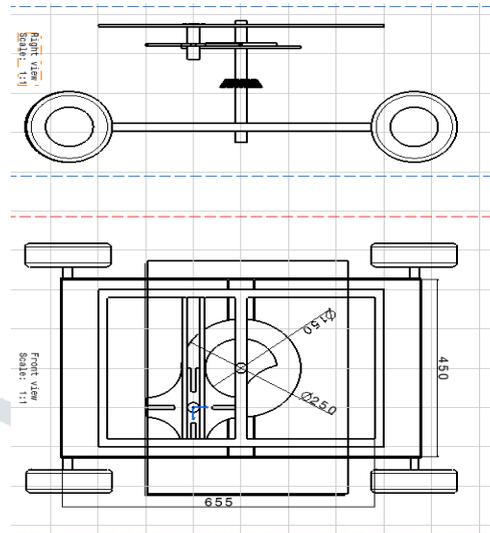


Fig. 3 Mechanism with Geneva with lead screw

Evaluation

The evaluation of the concept has been made against various requirements. The most important requirements are as follows:

- 1) High strength
- 2) Low manufacturing cost
- 3) Easy manufacturing
- 4) Reduce complexity of dumping

As seen from future and limitation of each, concept 3 is better for our application point of view as it is good strength due to supporting structure can be manufactured by welding with low cost. Design of concept 3 is not complicated; therefore concept 3 will be selected for further development and construction.

III. GENEVA MECHANISM

The Geneva mechanism is also known as Maltese cross. It consist of driven wheels has four slots and for each rotation of the drive wheel with a step of 90°. When the driven wheel has n number of slots, it leads by 360°/n per full rotation of the drive wheel.

Design of Geneva mechanism:

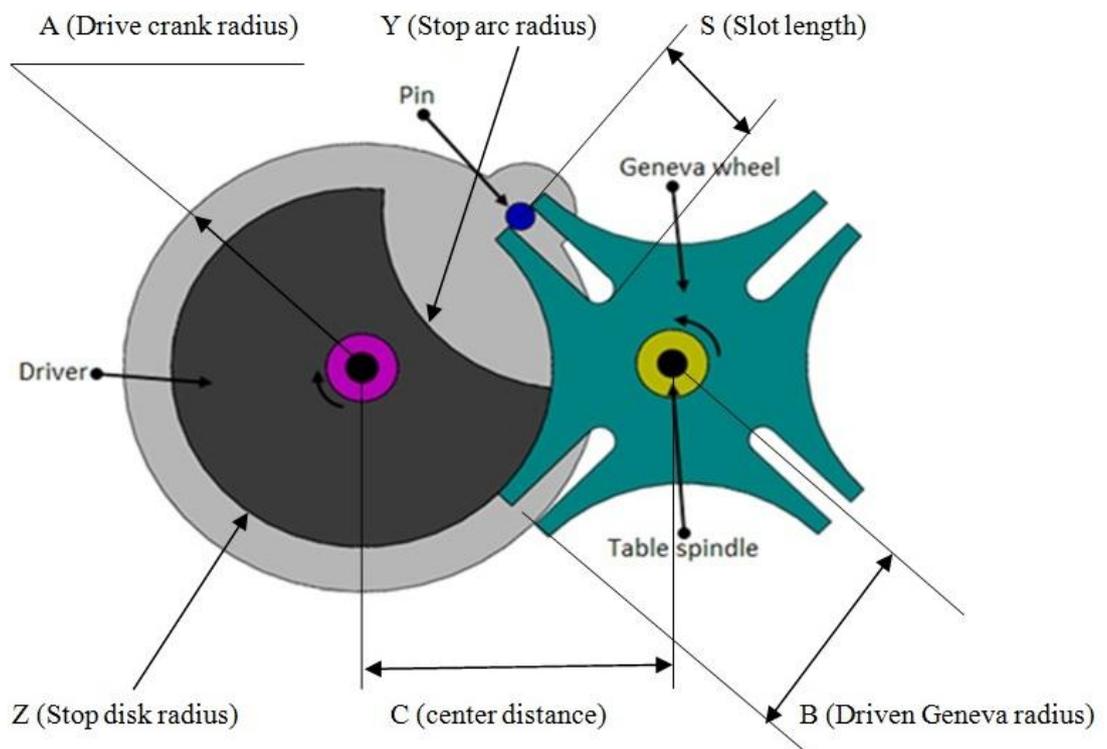


Fig4.5: Geneva Mechanism

Design parameters[5] :

A= Drive crank radius

n= Driven slot quantity

p= Drive pin Diameter

t= Allowed slot clearance

C= Centre distance

$$C = \frac{A}{\sin \frac{180}{n}}$$

B=Driven Geneva wheel radius

$$B = \sqrt{C^2 - A^2}$$

S=slot Centre length

$$S = (A+B)-C$$

Y=Stop arc radius

$$Y = A - (p \times 1.5)$$

Z= Stop arc radius

$$Z = Y - t$$

IV. CONCLUSION:-

We have developed model of Multi-directional dumping trailer and it exhibits the expected results. Various parts of trailer were studied and their performance was analyzed in terms of the work. This mechanism is applicable for various manufacturing and agriculture sector. The operating procedure of this system is very simple, so any person can operate and make it user friendly.

V. REFERENCES

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