DESIGN AND FABRICATION OF SEMI AUTOMATIC TRAILER STEERING MECHANISM

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ABSTRACT

The "Semi-Automatic Trailer Steering Mechanism" has been conceived having studied the difficulty in unloading the materials. Our survey in the regard in several automobile garages, revealed the facts that mostly some difficult methods were adopted in unloading the materials from the trailer. Now the project has mainly concentrated on this difficulty, and hence a suitable arrangement has been designed.

Keyword: - *Trailer, Unloading, and Automobile Garage etc….*

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1. INTRODUCTION

The hydraulic fluid is passed to the bottle jack to work it like a lifting the trailer cabin. This hydraulic fluid is used to activate the bottle jack. In a movable tray the revolving hydraulic modern trailer is placed. The setup consists of a bottle jack, 360 degree rotatable wheel, and a tray for lifting purpose. The dc motor used to turn the whole trailer. The hydraulic jack is operated after the rotation of the tray is stopped for unloading purpose.

A semi-trailer is a trailer without a front axle. A large proportion of its weight is supported by a tractor unit, a detachable front axle assembly known as a dolly, or the tail of another trailer. A semi-trailer is normally equipped with landing gear legs which can be lowered to support it when it is uncoupled. Many semi-trailers have wheels that are capable of being totally dismounted and are also relocatable to better distribute load to bearing wheel weight factors.

Semi-trailers are more popular for transport than full trailers, which have both front and rear axles. Ease of backing is cited as one of the semi's chief advantages. A road tractor coupled to a semi-trailer is often called a semi-trailer truck or "semi" in north America & Australia, and an articulated lorry or "artic" in the UK, New Zealand & Australia. Semi-trailers with two trailer units are called "B-doubles" or in American English 'tandem trailers' or often just "doubles", and are often referred to as , "B-Trains", or when there are three or more trailers, "road trains".

A B-double or 'tandem rig' consists of a prime mover towing two semi-trailers, where the first semi-trailer is connected to the prime mover by a fifth wheel coupling and the second semi-trailer is connected to the first semi-trailer by a fifth wheel coupling. In Australian English, the tractor unit is usually referred to as a "prime-mover", and the combination of a prime-mover and trailer is known as a "semi-trailer" or "semi". The fifth wheel on a truck connects to a semi-trailer kingpin. Kingpins come in many forms, but the most common within the UK market is the 2.0-in EEC-approved type. This kingpin is fully interchangeable and, given a strict maintenance schedule, it should last the life of a trailer.

2. DESCRIPTION OF EQUIPMENTS

2.1 AC Gear Motor

An AC gear motor uses primary and secondary windings, or magnets. The primary winding receives energy when it's attached to an electric outlet. Through a phenomenon known as induction, the secondary winding receives power from the primary winding without touching it. When you combine an AC gear motor with a series of gears or a gearbox, a gear motor reduces the speed of the gears and creates torque. When using a gearbox, a reduction shaft connects it to the main shaft and motor rotor, or armature. The rotor is the rotating part of a motor. The reduction shaft also uses reduction gears that connect to the gearbox or series of gears. The more reduction gears present, the lower the output of the final gear. A gear motor's stator is the housing that contains coils on a motor's exterior. It creates a stationary magnetic field. The winding, or coils, in a gear motor are insulated wires around a motor's core that receive or create electromagnetic energy. An example of an AC motor in work is an electric clock with hands. AC gear motor can spin the clock's rotor at up to 1,500 RPMs. By adding a series of reduction gears, the clock's hands move at a slower pace. There are a handful of AC gear motors, including induction, universal, synchronous and shaded-pole motors

2.2 Hydraulic cylinder

Hydraulic cylinders haven't really changed a lot over the years. The manufacturing processes are much more streamlined and the tolerances are much tighter, but for the most part cylinders are still the hard working push/pull tools they have always been. These things have literally shaped the world around us. Anything that gets lifted, pushed, hauled, dumped, dug, crushed, drilled or graded has gotten that way by some truck, crane, dozer or tractor using a hydraulic cylinder. The amazing amount of force a cylinder exerts is due to the simple mechanical principle of pressure exerted on the surface area of the piston. Simply put, the larger the diameter of the cylinder, the more it will lift. The formula for this is Area X PSI (*Pounds per square inch*) = Force.

The *PISTON* is inside the cylinder, the diameter of which is known as the *BORE*. OK, technically, the bore is the inside diameter of the tubing but this difference is of minor significance. The piston needs a piston *seal* to keep the pressure from bypassing to the other side, which allows it to build the required pressure (If a cylinder isn't lifting the force it should, the piston seal is probably worn).

The piston is attached to the ROD (or shaft) of the cylinder, usually with the rod passing through the piston and attached with a large nut on the opposite end. To correctly calculate the *pulling force* of a cylinder, the surface area of the rod must be subtracted from the formula. The rod is probably the hardest worked component in the whole system. The rod is the largest single chunk of steel in the cylinder, unpainted and exposed to all the elements. It has to be extremely strong (to resist bending), exceptionally hard (to resist corrosion and pitting), and smooth as silk (to keep the rod seals intact to prevent leakage of fluid and pressure). The *STROKE* of the cylinder is the total travel possible from the fully retracted length and the fully extended length of the rod.

3. WORKIMG

The caster angle has been indented as the most effective parameter in the steering geometry to control the steering. The only additional requirement compared to state- of-the-art mechanisms that allow self-steering during reverse travel is to rotate the casters of both wheels independently. For a change of the direction of travel, both rotations need to be parallel to generate a positive caster. To impudence the steering angle, they need to change opposite to each other. It is preferable, but not required, to adjust only the caster of the wheel that steers to the outside and to leave the second kingpin in its initial position. Without a high-power actuation, the rotation can be obtained passively by introducing a spring-like element. The design of both linear and progressive springs has been discussed. The result is a passive steering system that amplifies the steering angle of conventional self-steering without any actuation, resembling the steering behavior of directly actuated command steer systems and improving the low-speed performance of the vehicle. A locking mechanism can be used to allow a switching between amplified and conventional self-steering. it is passive steering amplification does not require any actuation forces. Optionally, a low-power electric or pneumatic actuation can be introduced to influence the steering selectively. In a most consequent implementation of the ideas developed, the steering angle can be rendered completely controllable without any further actuation by a spring with adjustable stiffness. The approach proposed can be translated into many different mechanical designs. Under the aspect of technical feasibility, the analysis of this work introduced a preliminary steering mechanism that is integrated into a state-of-the-art suspension. In such suspensions, the axle by design impedes an independent caster change. Re-design of the suspension, in particular the use of an independent wheel suspension, promises opportunities to and an economically more competitive solution.

4. CONCLUSIONS

Instead of complicated designs the simple kinematic system is used. In this system bending of stirrup wire can extended to its length against workstation is possible The rate of production is around 1000 to 1250 stirrups in 8 hours of effective working per day. The system can be handled by any operator very easily. Due to low cost and simple design this can be marketed to any of the nation.

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