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Automated Vehicle Up Lifting System

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Abstract: ***An advanced vehicle lifting system is designed to provide an intelligible, conscientious and safe means for a vehicle to elevate one or more of the wheels from the ground or for a multiplicity, for example changing a flat tire, lifting a machine, etc. A united jack system for a motor vehicle comprising a specially designed jack which is bracketed inside the A-PILLAR of an automobile. This system comprises one or more frame mounted (A-PILLAR) hydro-pneumatic jack. Components used in this invention are driven by actuators powered by the vehicle engine and activated by a dashboard or other switch. A series of combination of hydraulic and pneumatic specially designed in-built jack units are mounted inside the A-PILLAR of a vehicle or automobile unit. A united jack system for a motor vehicle comprising a specially designed jack which is bracketed inside the A-PILLAR of an automobile. On implementation, would definitely help in the maintenance of automobiles and also in saving of time.***

Keywords - Hydro-Pneumatic, Actuators, A-PILLAR, Jack .

I. INTRODUCTION

Accordingly, a system is needed to speed up lifting a vehicle at the roadside and retrieving a spare tire which. This system is designed with the aim to provide a relatively easy and safe means for reducing the number of steps required, and which requires only minimal user strength and knowledge with the system totally built in the vehicle. And even with giving no possibility of its existence in appearance. Smart vehicle uplifting systems features combination of hydraulic and pneumatic system are known to the prior art; though, these are often large, recondite units, their installation and operation are overpriced and prone to glitch. It is apparent, however, that the operator must come on the road to operate the vehicle which may result in accident. This discovery relates to vehicle jacks and similar methods for raising vehicle wheels from the ground. With good accuracy, this work presents a frame mounted vehicle lift system. Jacks are devices used to lift heavy objects, particularly automobile's. In order to change a flat tire, the wheel of the automobiles must be raised off the ground so that the flat tire can be changed. In other circumstances, a jack is used when the underside of the vehicle must be attaining for analysis or overhaul. Ever since automobiles came into widespread use in the early twentieth century, vehicle drivers have used mechanical devices to elevate the vehicle off the ground for juncture roadside repairs, such as changing a flat tire. The four wheelers are sold with a spare wheel and a mechanical jack. The operation of the jack requires the driver to place the jack below the vehicle and lift it, but all this need some skill and physical strength by the operator and is dangerous even when properly performed because the jack may become extricate while supporting the weight of the vehicle, causing the vehicle to fall and seriously injure or kill the user. The jack must be positioned safely on the ground beneath the vehicle frame and requires a stable surface which can bear a portion of the vehicle's weight without the jack easily becoming extricated. This process requires some degree of strength and effort by the user. When a flat tire is being changed, the user must reclaim the replacement from the vehicles spare tire storage compartment. In some cases, such as with many pick-up truck models, this process requires lowering the spare from its storage compartment beneath the vehicle and lifting the spare free from its storage mounting while in an awkward position. This may happen at the night also. Thus, changing a tyre is difficult and potentially dangerous procedure requiring multiple steps. Retrieving a spare tire, particularly in many pick-up truck models, is and burdensome & awkward.

II. LITERATURE REVIEW

K.Sainath and et. al. have studied and investigated about a jack which is a device that used to lift vehicles. The application of force depends upon the type of jack. Hydraulic jack has higher capacity to lift loads.. Pascal’s law is used in the operation principle. Hydraulic jacks depend on this basic principle to lift heavy loads: they use pump plungers to move oil through two cylinders. The plunger is moved forward which opens the suction valve and draws oil into the pump chamber. As the plunger is pushed forward, the oil moves through an external discharge check valve into the cylinder chamber, and the suction valve closes, which results in pressure building within the cylinder. Mithil.R has focussed on the difficulty in lifting any type of vehicles. His survey expressed the facts that some difficult ways are adopted in lifting the vehicles for reconditioning. The work mainly is concentrated on this

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difficulty. In this project we are converting the conventional hydraulic jack in to automated hydraulic jack by using linkage mechanism with a help of a motor.. It works on the principle of Pascal law the invention relates to hydraulic jack and more specifically to an automobile hydraulic jack system. The fabrication part of it has been considered with almost case for simplicity and economy, such that this can be accommodated as one of the essential tools on automobile garages. Abhijeet Bambode gave his opinion that here is a hydraulic jack can be mounted centrally to the front and rear suspension of an automobile. The system works on a compressed oil. Mohammed Abuzaid and et. all have studied and investigated that an inbuilt hydraulic jack system is attached to automobile vehicle on front and rear part of the chassis. An automobile hydraulic jack system can be easily attached to all currently manufacture automobile chassis and frames. There is a front suspension hydraulic jack that is mounted centrally to the front suspension of an automobile between its front wheels. There is also a rear suspension hydraulic jack that is mounted centrally to the rear suspension of the automobile between its rear wheels. The system operates from a compressed fluid reservoir tank that has connections for the front and rear car jack outlets. Additional outlets can be added to the compressed fluid reservoir tank for connecting a hydraulic lug wrench and another for a tire inflating hose. The Major Project entitled "Inbuilt hydraulic jack in automobile vehicle" Worked on the principal of hydraulic power and operated by 12 Volt DC current, solves the all major problem of maintenance of all automobiles specially the heavy vehicles like truck and bus. This work, if implemented, would definitely help in the maintenance of automobiles and also in saving of time.Pawar R. R. and et. al. have studied and investigated that The purpose of this paper is to design a screw jack which is easy for operating, safe and able to lift and lowering the car without spending much effort. Manually operated car jacks need physical efforts for the elderly, handicapped, and women's..

III. PROBLEM STATEMENT

Traditional method is to operate the jack by handle by aligning with ground for jacking are which in some cases is provided to the vehicle the other step is to manually handle and Screw jacks are limited in their lifting capacity. In various conditions such as changing the flat tire and problem identification and various issues which are to be addressed by lifting the vehicle at list on one or more tire the problems faced which lifting the vehicles are enormous now a days the drivers of mostly travel car or the regular basis driver have to face many problems in day to day life for lifting the vehicle, the available traditional jacking system the market is provisional and the only method to uplift the system and with such even after their operation is much more difficult and in some cases kit can also result to a damaging of the vehicle body if their no proper reservation space provided for the jacking hence it gets more complicated. Increasing load increases friction within the screw threads. A fine pitch thread, which would increase the advantage of the screw, also reduces the size and strength of the threads. Longer operating levers soon reach a point where the lever will simply bend at their inner end. And also while jacking it also leads to the contact between the operator's fingers to the road which also increase the toughness for operator. Hydraulic jack may cause major damage to automobile body and even the operator.

A. Proposed Solution

Our mechanism is mainly used for lifting the car and heavy machines. Considering some design aspects in an inbuilt car lifting mechanism can easily be fitted in all light weight automobiles while manufacturing. The project works on hydraulic power provided by engine. The switch of the system will be provided at the dashboard, near the operator. The engine will run the pump. The pump will press the oil from the reservoir to the manifold block. Flow control valve will regulate the discharge.. The piston will lift the car on reaching the ground level. For the down movement of a lifted car the user can again operate the control valve which will direct the flow of oil to the other side of cylinder and the stroke will be imparted with pressurized oil. For down movement the direction of oil will be changed. This will stop the pump and the circulation of oil in the system. Maintenance and service of the vehicle can be easily done. The usage of automobile lifting can be made easy for women and senior citizens as per the situation. Some extra automation like solenoid control valve can add great value to the project.

IV. COMPONENTS USED

Gear Pump is employed to increase the pressure of oil in the system. Power Steering Pump: In all the vehicle where the power steering is used the system functions on the hydraulics system and with the help of which the same pressure can be used to operate the system and with the help of which the system can easily lift the weight of the vehicle. Vane pump which is driven by belt is used in steering system. Solenoid operated direction control valve used to control the operation of the actuator. As the valve will be the solenoid operated valve the operation will be performed directly from the dash board and will be the final stage operation mode to actuate the vehicle jack..Hose also called as pipe is a flexible hollow tube designed to carry fluids from one location to another.

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Other hose materials include PTFE (Teflon), stainless steel and other metals. Actuator is placed inside the A-pillar section of the automobile with the complete compact system and the inbuilt will be coming during the manufacturing of the vehicle The actuator is a special designed double acting hydraulic cylinder which id modified according to the aesthetic appearance of the vehicle and the space available inside the A-PILLAR The actuator consist of the multipurpose joints given to it such as the double acting cylinder consist of the clevis mounting , the ram 1 of the double acting cylinder and the ram two are connected with the help of the ball joint Ball joint:- In an automobile, ball joints are spherical bearings that connect the control arms to the steering knuckles. They are similar to the human hip joint. Motion-control ball joints tend to be retained with an internal spring, which helps to prevent vibration problems in the linkage. Check valve is used to allow the entry of oil in one direction only and restrict in opposite direction. Flow valves can also work with hydraulic actuators (also known as hydraulic pilots). These types of valves are also known as Automatic Control Valves. The hydraulic actuators will respond to changes of pressure or flow and will open/close the valve. Automatic Control Valves do not require an external power source, meaning that the fluid pressure is enough to open and close the valve. Oil Tank (Reservoir) : The hydraulic fluid reservoir holds excess hydraulic fluid to accommodate volume changes from: cylinder extension and contraction, temperature driven expansion and contraction, and leaks. The reservoir is also designed to aid in separation of air from the fluid and also work as a heat accumulator to cover losses in the system when peak power is used. Design engineers are always pressured to reduce the size of hydraulic reservoirs, while equipment operators always appreciate larger reservoirs. Reservoirs can also help separate dirt and other particulate from the oil, as the particulate will generally settle to the bottom of the tank. Some designs include dynamic flow channels on the fluid's return path that allow for a smaller reservoir. Hydraulic Oil: The primary function of a hydraulic fluid is to convey power. In use, however, there are other important functions of hydraulic fluid such as protection of the hydraulic machine components. The table below lists the major functions of a hydraulic fluid and the properties of a fluid that affect its ability to perform that function.

V. WORKING

As the system is basically designed to lift the heavy load and compact the system will be functioning on the hydraulic system in the hydraulic system the different components will be used such as the external gear pump will be generating the required pressure for lifting the vehicle and also the pressure will be according the weight of the vehicle in the system then the pressure will be controlled with the help of the pressure control valve which will be pre-set to the required pressures according the weight of the vehicle and the pressure required to lift it considering the dimensions of the actuators and then the pressurised fluid will be passing through the flow control valve and with the help of the Direction control valve the direction and the moment of the actuator can be controlled by this system will be function A hydraulic circuit is a system comprising an interconnected set of discrete components that transport liquid. The purpose of this system may be to control where fluid flows (as in a network of tubes of coolant in a thermodynamic system) or to control fluid pressure (as in hydraulic amplifiers). For example, hydraulic machinery uses hydraulic circuits (in which hydraulic fluid is pushed, under pressure, through hydraulic pumps, pipes, tubes, hoses, hydraulic motors, hydraulic cylinders, and so on) to move heavy loads. The approach of describing a fluid system in terms of discrete components is inspired by the success of electrical circuit theory. Just as electric circuit theory works when elements are discrete and linear, hydraulic circuit theory works best when the elements (passive component such as pipes or transmission lines or active components such as power packs or pumps) are discrete and linear. This usually means that hydraulic circuit analysis works best for long, thin tubes with discrete pumps, as found in chemical process flow systems or micro scale devices. Hydraulic fluid is transmitted throughout the machine to various hydraulic motors and hydraulic cylinders and becomes pressurised according to the resistance present. The fluid is controlled directly or automatically by control valves and distributed through hoses and tubes. The popularity of hydraulic machinery is due to the very large amount of power that can be transferred through small tubes and flexible hoses, and the high power density and wide array of actuators that can make use of this power. In original as in car there is no need of using the external gear pumps and all other components of the hydraulic system in the vehicle the power steering unit is already functioning on the hydraulic system and with the help of it the system can be functioning during the car has to be lifted and the system will be more efficient and much more affordable and by such way the system will be functioning in the car.

A. Advantages of Automated Vehicle Up-Lifting System

1) The required efforts are less and saves time.
2) The jack is automatically operated so, the complications of finding the jack point is neglected.
3) It can be easily operated by a rookie and women.

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4) The system is smooth and quite in operation.
5) To reduce the stress acting on the operator. vi. Completely minimizing the accidents caused during the carjacking process.

B. Applications

1) This is used to lift vehicles for tire changing process.
2) Used in automobiles while maintenance jacking.
3) Used to lift heavy machines and moving from one place to another

VI. FUTURE SCOPE

Hydro-Pneumatic cylinder, the combination of a hydraulic circuit built in a pneumatic cylinder outcome in a system which provides the advantages of compressed air, such as speed, combined with the possibility of accurate and precise moving control offered by the hydraulic circuit. The hydro-pneumatic cylinders are magnetic as pre-standard, with pneumatic cushioning and are available in various bore diameter.

VII. CONCLUSION

The automated vehicle up-lifting system project was successfully implemented with the prototype model considering the calculation and the various load and the external factors acting on to it. This project would be of most useful for reducing the uphill battle against the torture faced using traditional methods. Completely functions on atomisation. This design functions on the automation with the help of the oil hydraulic system, an actuator with the property to adopt and accommodate the compact and the aerodynamic shape of the vehicle. A smart system which can be made more affordable to all by making it manual. With combination of hydraulic and pneumatic system. As this is an open source project the market potential for it makes no sense. The main motivation is experimentation and developing a world class piece of elevating system. On the flip side the popularity of this project is expected to be huge. We expect that the number of units of this project would surpass in the very first year. Then with more addition in function.

REFERENCES

[1] K.Sainath and Mohd Salahuddin, " Design of Mechanical Hydraulic Jack", Vol. 04, Issue 07 July. 2014, V1 PP 15-28, ISSN (e): 2250-3021, ISSN (p): 2278-8719
[2] Mithil.R and Mijith.c, " Fabrication of Electro Hydraulic Jack", Volume: 03 Issue: 02 | Feb-2016, e-ISSN: 2395 -0056, p-ISSN: 2395-0072
[3] Abhijeet Bambode, "Hydraulic Jack For Heavy Vehicles", Volume: 1 Issue:3, e-ISSN: 2394-8299, p-ISSN: 2394-8280
[4] Mohammed Abuzaid, "Inbuilt Hydraulic Jack in Automobile Vehicles", Vol.2 Issue2 April 2013, ISSN 2319-1058
[5] Pawar R. R. and Shinde M. S, "Recent Technologies in Automobiles: Need of Motorised Screw Jack: A Review", Volume 4, Issue 4, April 2015, ISSN 2347-6435(Online)

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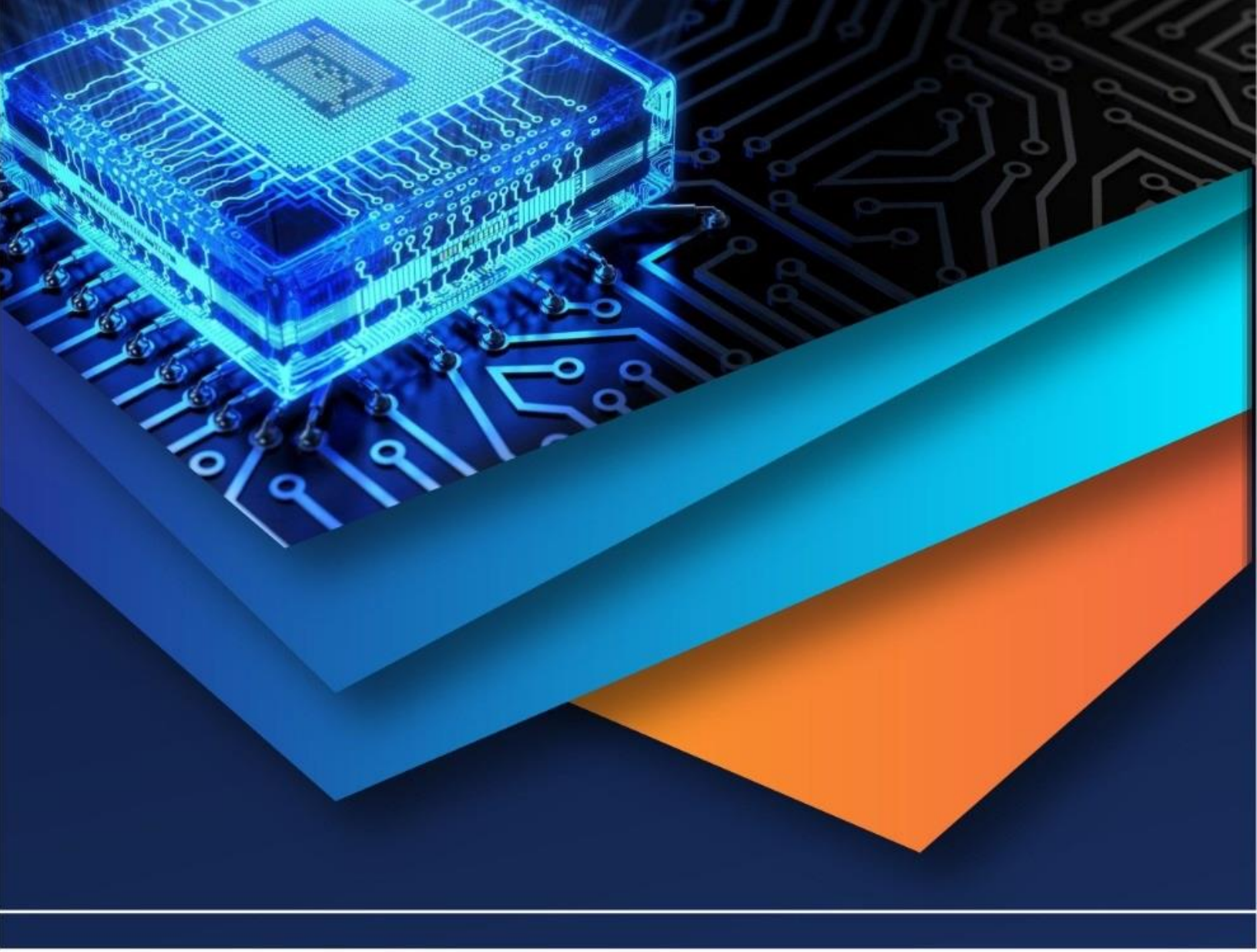

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