

Integrated Automated Scissor Jack For LMVs

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I. ABSTRACT:

Now-A-Days, everybody is aware of the several complications and anomalies that may or may not occur in a simple LMV. These complications include unanticipated breakdown, flat tire, etc. or any such complication that renders the vehicle to a halt and unusable. A crude solution for such complications that has been implemented since a long time is a manually operated jack. Hence, irrespective of its size and weight a jack that is used to lift the vehicle is one of the most essential accessories that need to be constantly kept close at hand. Thus, the need of keeping the jack available is undeniable. These days several types of either manually operated or automatic jacks whether lightweight/portable or heavy are widely used to fulfill their purposes in lifting heavy as well as light equipments. There are only a few types of jacks that are consistently used for lifting a vehicle during its repair work or any such purpose viz. manually operated scissor jacks, manually operated screw jacks, manually operated hydraulic jacks etc. Even though they fulfill their purpose there is a huge drawback to these kinds of jack i.e. they are manually operated and consume a substantial amount of time and energy for their operation. Thus an alternative for these jacks which is already integrated and automatic would prove to be beneficial to the end user as well as the repairmen. One such alternative is the Integrated Automated Scissor Jack. This jack would be permanently mounted on the chassis on the vehicle and will be automatically operated which will evidently eliminate manually operating it to raise the vehicle and would save valuable time.

Keywords- Light moving vehicles, Integrated automated jack, Scissor Jack, Chassis.

II. INTRODUCTION:

Due to the difficulty of operating automobile jacks, various forms of electric jacks have been proffered. With the development of such electric jacks has gradually come an understanding of some of the problems associated therewith. Due to the torque needed to lift something as heavy as most automobiles, direct drive electric motors are not reliable; therefore, reduction gear drive mechanisms of some sort should be employed, as a severe mechanical advantage must be utilized. Direct motor-to-jack drive, with only two gears, fails to accomplish this task. Electric jacks that are built into an automobile have not been accepted due to expense and the need to at least lift each side of an auto, if not all corners individually. If a system is chosen to individually lift each corner of the auto, even greater expense in design, production, and cost is encountered. Some have even entertained total encasement of a scissor jack type device. The invention relates to hydraulic jack and more specifically to an automobile hydraulic jack system. In most of the garages the vehicles are lifted by using screw jack. This needs high man power and skilled labors In the past both hydraulic and pneumatic jack has been utilized in combination with the structure of automobile. They have always utilized a separate jack for each of 4 wheels by having the jacks permanently installed on the vehicle. They are ready to operation at all time. Lifting device has been installed on vehicle, such as air lifting device. Various types of jack or lift devices has been installed on vehicle which are turned in 1 fashion or another from a horizontal altitude into a vertical altitude and then extended for the purpose of lifting the vehicle. It is an object of the invention to provide a novel scissor jack system that only utilized scissor jacks, one that is mounted on chassis on side of car between two wheels and 2 jacks that is mounted on side of automobile between its side wheels. It is also an object of invention to provide novel jack system that can be operated by driver from inside the car. It is also an object of invention to. Now the project has mainly concentrated on this difficulty, and hence such that the vehicles can be lifted from the floor land without application of any impact force. By pressing the button in the dashboard, it activates the scissor jack automatically.

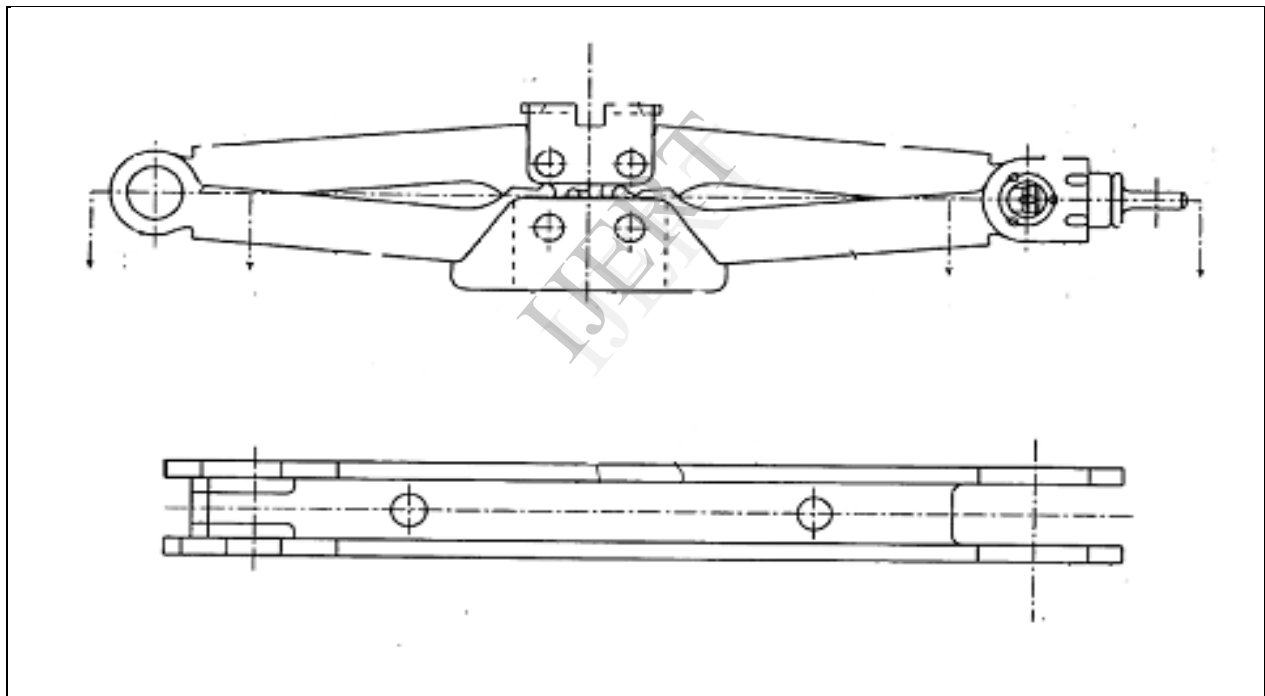
It is believed that 'Necessity is the mother of invention'. Here the necessity lies in reducing the human effort applied during manual operation of the jacks and hence the need of the invention. In day to day life it is very tedious job to operate the jack manually and it is also a very time consuming work as well. To reduce the human effort for operating any kind of

jack separately. This will most appropriately benefit senior citizens To provide a safe and simple automatic scissor jacking system without manual effort. To provide a novel jacking system that can be operated from within the vehicle by means of a dashboard control panel. There are certain mechanisms already available for the same purpose which has a definite capacity to lift the car on 2 wheels viz. a screw jack, hydraulic jack etc. But the general idea of the project is to minimize the human effort while operating the jack. To provide a novel scissor jacking system that is directly and permanently incorporated into the vehicle frame in such a way as to prevent the additional risk of damage or wear and tear.

A primary object of the present invention is to provide a motorized scissor jack for automobiles that can be used during inclement weather. Another object of the present invention is to provide a motorized scissor jack that is driven by the electric power source from the 12 volt battery of any automobile. Yet another object of the present invention is to provide a motorized scissor jack that a motor is provided for the rotation of a displacement screw, clockwise and counter clockwise in order to provide for the raising and lowering of the frame portion of the scissor jack. Still yet another object of the present invention is to provide a motorized scissor jack for automobiles that provides an upper limit switch positioned in a sealed housing that as the jack moves in an upward direction a driving element on one portion of the upper structure makes contact with a biased displacement element on the opposing portion of the upper structure driving a contact of the biased element into a contact of a fixed contact to complete the limiting circuit. Another object of the present invention is to provide a motorized scissor jack for automobiles that provides a lower limit switch that as the jack moves in a downward direction the displacement screw comes in direct contact with a limit switch roller and drives a contact of a bias displacement element into a fixed contact to complete the limiting circuit. An object of the electric scissor jack apparatus is to use electrical power already available to elevate an automobile. Another object of the electric scissor jack apparatus is to incorporate a scissor jack in electrically elevating an automobile. An added object of the electric scissor jack apparatus is to employ gear reduction drive between the motor and the scissor jack. A further object of the electric scissor jack apparatus is to ensure a fail-safe coupling between the gear reduction drive and the scissor jack. And, an object of the electric scissor jack apparatus is to gain electrical power from the battery from an automobile. Yet another object of the electric scissor jack apparatus is to provide for an inexpensive multiple jack size utilization with a motor

and gear reduction member change. A further object of the electric scissor jack apparatus is to be integrated.

Scissor jack is one of the most widely used accessories for lifting vehicles and light or heavy equipments. It is relatively cheaper than its counterparts and most widely and readily available. It is made up of High Carbon Steel and other alloying elements which impart strength and ductility. It is rigid in construction but flexible in its pattern of usage. Flexible in a sense that it can be used for a variety of purposes ranging from lifting of cars to elevating foundations of a house for which scissor jacks of very high capacity can be used.



SCISSOR JACK

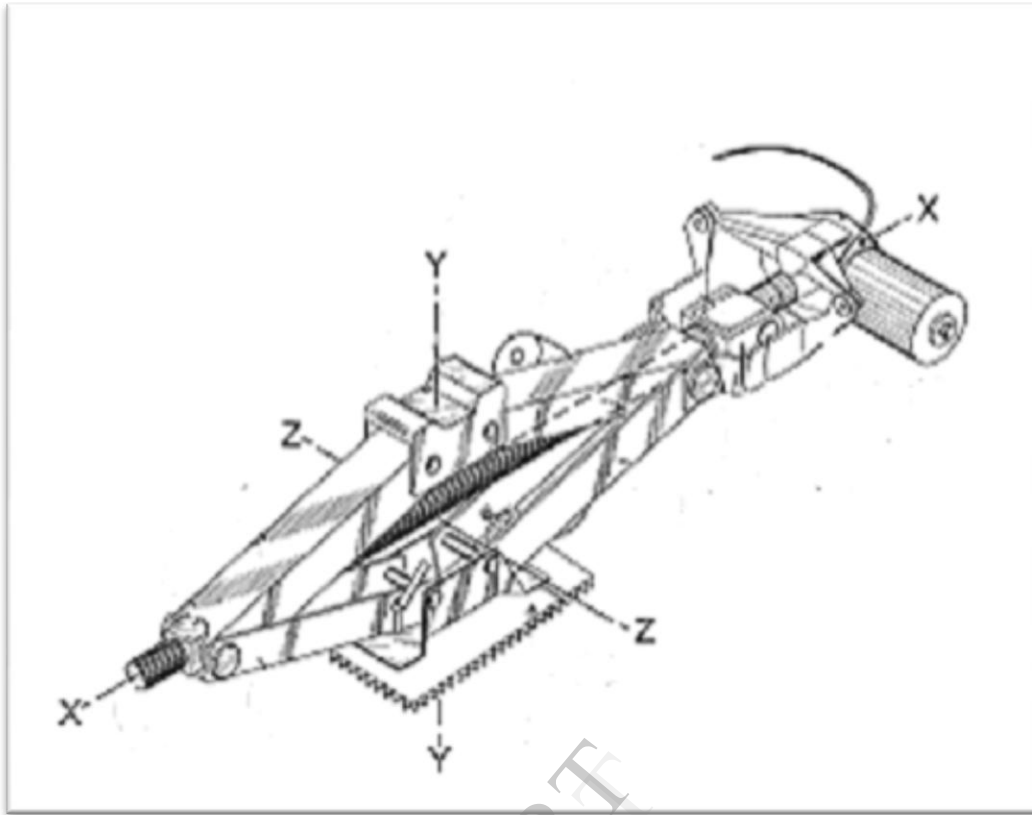
III. CONSTRUCTION AND WORKING:

Scissor jack is operated using a motor powered by a 12V Battery that is already available in the vehicle. This jack, thus, ultimately uses the vehicle power for its operation. Speed reduction gears are provided for adjusting the speed of winding and unwinding of the jack as well as for power transmission from motor to the screw. Limit switches are provided in this mechanism that can be operated from the dashboard of the vehicle, to wind and unwind the screw of the scissor jack. In lieu of an unanticipated power failure of the vehicle power or the battery, a handle is provided for manually operating the scissor jack.



CHASSIS

From the above illustrated figure the fabricated chassis can be seen. This prototype of a chassis is made from a Cast Iron hollow pipe material of cross-section 2 inch x 1 inch. The total length and width of this frame is 6 feet and 3 feet respectively. The shape of this frame can be visualized as being similar to the actual chassis of a 4 wheeled vehicle.



An automatic jack having at least one inverted jack driven by an electric motor permanently attached to the vehicle. The system may employ a jack disposed between the front and rear wheel on each side of the vehicle, or it may be equipped with a jack at each of the four wheels. This system relates to a jacking arrangement for automobiles whereby a lifting jack is secured on the lower part of the chassis of a vehicle. The jack has a scissors configuration with a motor positioned between scissor arm elements. The extension of the jack is limited by a switch handle which is configured for cutting off the current flow as the switch is closed by the action of a jack arm approximately reaching a maximum extension position. Simultaneously, a switch handle is depressed changing the polarity of the current flow through the motor thereby positioning the motor for the retraction of the jack. At the instant prior to the jack reaching a maximum retracted position, polarity switch handle is depressed again reversing the polarity of the motor. Electric motor drive arrangement for the operation of lifting and descending of the vehicle to its position for operation is the main principle of operation of this system. The jack has gear configured for a high speed and a low speed of operation. Switches and are used to control the direction of movement of the jack. Releasing the switches during operation stops the jack in the present position. The scissors jack includes a DC motor driven through a deceleration gear

box for rotating a screw rod clockwise or counter-clockwise for the raising of the frames of scissors jacks. The jack provides the ability for the automatic raising of vehicles as well as the higher raising and lower collapsing functions and a more powerful raising capability. The jack also includes one ultimate switch for peak and low bottom points. The power supply is automatically cut off when a lower raising rod pushes snapping rod of an ultimate switch. A direct drive electromotive jack device for releasing a torsional force is described and comprises a jack with a driving screw rod, an electromotive motor arranged with a deceleration gearbox, a torsional force releasing means directly connected to a positioning plate, and a power supply directly switch operable by an operator. The torsional force releasing means serves to connect the electromotive motor with the jack. The torsional force releasing means comprises a positioning plate for fixing the electromotive motor; two or more than two symmetric arms of torsional force; a bearing for being passed through the electromotive motor; and a switch connected to the driving screw rod. When the rotary shaft of the electromotive motor rotates, the torsional force can be cancelled by the torsional force releasing means for preventing the jack from generating a strain or being tilt; moreover, by a switch of a power source to control the direction of the current flow, the jack can be lifted or descended.



IV. ADVANTAGES:

The advantages of automated scissor jack are as below:-

- Simpler design. In most cases, a few pre-engineered components will replace complicated mechanical linkages.
- Smoothness. Scissor jacks are smooth and quiet in operation. Vibration is kept to a minimum.
- Control of a wide range of speed and forces is easily possible.
- Cost. High efficiency with minimum friction loss keeps the cost of a power transmission at a minimum.
- Overload protection. Automatic valves guard the system against a breakdown from overloading.
- .Checking and cleaning are easy.
- Repairing is easy.
- Replacement of parts is easy.
- The loaded light vehicles can be easily lifted.
- Manual power not required.
- Handling is easy.

V. DISADVANTAGES:

The possible disadvantages of this invention may be as below:

- Elements of this system have to be manufactured separately to a high degree of precision which increases the overall manufacturing cost of the system.
- Higher degree of maintenance is required and hence maintenance cost is increased.
- The entire system is subjected to mechanical friction, hence regular lubrication must be provided.
- Additional protection against rust and corrosion is required.

VI. CONCLUSION:

The present invention is a vehicle scissor jack positioned on a each side between the front and rear wheels with an electric motor drive arrangement for the operation of lifting and descending of the vehicle to its position for operation. The jack has gear configured for a high speed and a low speed of operation. Switches and are used to control the direction of movement of the jack. Releasing the switches during operation stops the jack in the present position. This invention relates to a jacking arrangement for automobiles whereby a lifting jack is secured on the lower part of the chassis of a vehicle. The jack has a scissors configuration with a motor positioned between scissor arm elements. The extension of the jack is limited by a switch handle which is configured for cutting off the current flow as the switch is closed by the action of a jack arm approximately reaching a maximum extension position. Simultaneously, a switch handle is depressed changing the polarity of the current flow through the motor thereby positioning the motor for the retraction of the jack. At the instant prior to the jack reaching a maximum retracted position, polarity switch handle is depressed again reversing the polarity of the motor. In-place vehicle jack assemblies of the pivoted lever type configured for being permanently mounted at the front and rear of the vehicle frame structure are described. Each of the jack assemblies comprises a unitary device which is independently operable by an electrical motor, and independently selectively controlled at the jack or remotely from the control compartment of the vehicle.

VII. FUTURE SCOPE:

Since a jack has always been an integral part of any operation related to servicing of the vehicle therefore with some substantial modifications like, by increasing the required torque and power capacity of the jack it can be used also for HMVs. Some modifications can also be implemented into the designing of the vehicle chassis to accommodate the jack. This will not only be an efficient design but also be rugged.

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