

Pedal Press Pneumatic Lifter Jack

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Abstract- *This project, titled “Manual Pedal Press Pneumatic Lifter Jack,” involves the design and fabrication of a manually operated pneumatic lifting system with a lifting capacity of 120–145 kg. The system uses a 191 psi foot pump, a direction control valve, and a double-acting cylinder to lift and lower loads efficiently. The working principle is based on compressed air supplied through a pedal-operated pump, which is directed by the control valve into the cylinder to produce linear motion. The structure is fabricated using mild steel to provide sufficient strength and stability during operation.*

The main objective of this project is to develop a cost-effective, portable, and easy-to-operate lifting device suitable for workshops, garages, and small industries. The pneumatic lifter jack reduces manual effort, improves safety, and ensures smooth lifting compared to conventional mechanical jacks. Testing and observation confirm that the system performs reliably within the specified load range, demonstrating the practical application of pneumatic technology in light material handling operations.

Keywords: Foot Pump, Pneumatic Cylinder, Direction Control Valve, Nut & Bolts

I. INTRODUCTION

The Manual Pedal Press Pneumatic Lifter Jack is a mechanical device designed to lift heavy loads using compressed air. It is operated manually through a foot pedal which generates air pressure inside a pneumatic cylinder. The system reduces human effort and improves lifting efficiency in workshops and garages. This project focuses on the design, fabrication, and testing of a pneumatic lifting jack using mild steel frame and pneumatic components. The report explains the theoretical background, fabrication process, calculations, and performance evaluation in detail.

Material handling is an important part of mechanical engineering. In workshops and garages, lifting medium-weight loads safely is essential. This project focuses on the design and fabrication of a manual pedal press pneumatic lifter jack capable of lifting loads between 120 to 145 kg.

The system operates using compressed air generated by a foot pump (191 psi), controlled by a direction control valve, and actuated by a double-acting pneumatic cylinder. The jack is manually operated and cost-effective for small-scale applications.

II. PROBLEM IDENTIFICATION

In many workshops, garages, and small industries, lifting heavy objects or machines manually is a difficult and time-consuming task. Workers often need to apply a large amount of physical effort to lift loads, which can lead to fatigue, injuries, and reduced work efficiency. Traditional lifting methods are not always safe or convenient, especially when handling loads of around 120–145 kg.

To overcome this problem, there is a need for a simple, low-cost, and efficient lifting device that can reduce human effort. The manual pedal press pneumatic lifter jack is designed to solve this issue by using compressed air from a foot pump to operate a double-acting cylinder. This system helps in lifting heavy loads smoothly and safely while minimizing manual effort and improving productivity in small workshops and industries.

III. OBJECTIVE

The main objective of this project is to design and manufacture a manual pedal press pneumatic lifter jack. Additional objectives include reducing manual lifting effort, understanding pneumatic systems, developing fabrication skills, and ensuring safe and economical lifting mechanism suitable for small workshops.

The main objective of this project is to design and fabricate a Manual Pedal Press Pneumatic Lifter Jack with a lifting capacity of 120–145 kg using a 191 psi foot pump, direction control valve, and double acting cylinder.

Primary Objective

To design and manufacture a pneumatic lifting jack capable of safely lifting loads between 120 kg and 145 kg.

IV. WORKING PRINCIPLE

The system works on Pascal's Law, which states that pressure applied to a confined fluid is transmitted equally in all directions. When the pedal is pressed, compressed air enters the cylinder and pushes the piston upward. The piston rod lifts the top plate along with the load. When the valve is released, air escapes and the piston returns to its original position.

-The jack works on Pascal's Law:

- Pressure applied to a confined fluid (air) is transmitted equally in all directions.

-When the foot pump generates compressed air:

- Air enters the direction control valve (DCV).
- DCV directs air to either side of the double acting cylinder.
- The piston moves upward or downward.
- Load platform attached to piston lifts the load

V. ADVANTAGES

✓Low cost, simple design, easy operation, portability, and low maintenance are major advantages.

- The pneumatic lifter jack has a simple and easy construction.
 - It does not require electricity for operation.
 - The system is portable and easy to move.
 - It reduces manual lifting effort.
 - The double acting cylinder provides smooth lifting and lowering.
 - It is cleaner than hydraulic jacks as it uses air instead of oil.
 - Maintenance cost is low.
 - The structure is strong and durable.
 - It is economical and cost-effective.
- It is suitable for small workshops and garages.

VI. FOLLOWING ARE THE MAIN COMPONENTS OF PNEUMATIC JACK :-

1. Pneumatic Cylinder
2. Direction Control Valve
3. Foot pump
4. M.S Plate
5. Base frame

6.Nut & Bolt

1.Pneumatic cylinder



3.Foot pump



2. Direction Control Valve



4. M.S Plate



5.Nut & bolt



VII. CONCLUSION

The manual pedal press pneumatic lifter jack was successfully designed and fabricated. It demonstrated efficient lifting using compressed air and fulfilled project objectives.

The manual pedal press pneumatic lifter jack was successfully designed and fabricated to lift loads ranging from 120 kg to 145 kg. The system operates using a 191 psi foot pump, a direction control valve, and a double acting cylinder. Proper design calculations, material selection, and fabrication processes ensured safe and efficient performance. During testing, the jack lifted the maximum load smoothly without structural deformation or major air leakage.

The project achieved its objectives by developing a cost-effective, portable, and easy-to-operate lifting system suitable for small workshops and garages. It reduced manual effort and demonstrated the practical application of pneumatic principles such as Pascal's Law. Overall, the project enhanced practical knowledge in fabrication, assembly, and pneumatic system operation, making it a successful mechanical engineering application.

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