INTERNATIONAL JOURNAL OF ADVANCE RESEARCH, IDEAS AND INNOVATIONS IN TECHNOLOGY

ISSN: 2454-132X
Impact factor: 4.295
(Volume 5, Issue 2)
Available online at: www.ijariit.com

Design, development, and manufacturing of hydraulically operated coil spring compressor for MacPherson type suspension system

Haresh Sunil Rawool
akshay.rawool5@gmail.com
Rajendra Mane College of Engineering and Technology, Ambav, Maharashtra

Amit Anil Phansekar
amitphansekar1511@gmail.com
Rajendra Mane College of Engineering and Technology, Ambav, Maharashtra

Rushabh Ajay Kadam
rushabhkadam.rk@gmail.com
Rajendra Mane College of Engineering and Technology, Ambav, Maharashtra

Aditya Satish Dhoke
adhoke31@gmail.com
Rajendra Mane College of Engineering and Technology, Ambav, Maharashtra

Niranjan Nagesh Manchekar
nirman29@gmail.com
Rajendra Mane College of Engineering and Technology, Ambav, Maharashtra

ABSTRACT

The purpose of this tool is for use on, a MacPherson-type independent suspension assembly of a vehicle, the tool includes upper and lower C-shaped pressure brackets which for receiving spaced coils of the spring intermediate the opposed connected ends of the spring. Lower bracket is linearly adjustable for initial alignment with the spaced spring coils. A bottle jack is positioned below the lower bracket. Hydraulic pressure is provided through bottle jack mounted on the base for moving the bracket toward one another to compress the spring and for releasing the spring.

Keywords— *Macpherson, Plunger, Hydraulic pressure, Suction valve*

1. INTRODUCTION

It is possible to take a strut assembly apart with the help of coil spring puller, and then to its typically dangerous to attempt this. Since the coils are very strong, and under extreme pressure, they may move suddenly when the pressure is released. If a technician is in the front of the spring when back pressure arises, severe injury, or even death, may occur. Moreover, at that point, it would be difficult or impossible to put the assembly back together with a new shock absorber strut. One of the safest method and time reducing to replace strut without causing any harm to the technician is by using a coil spring compressor which is to be operated hydraulically.

2. SCOPE OF THE PROJECT

The scope for a tool to compress coil springs is well known in the art. The need for such tools has become even more important since more and more vehicles having independent suspensions are now in use. Many of these vehicles use a MacPherson-type strut suspension which is on vehicles because of its space saving attributes. In the after-market, the independent suspensions must be serviced, particularly the shock absorber cylinder which in the MacPherson-type independent suspension is located within the coil spring. Often a frame hoist is used, but even when the supporting members engaged by the spring are spaced apart at their maximum distance, the coil spring is often still under a load and must be compressed still further before it can be removed. Mechanical linkages have been used in the prior art to compress the springs, for example, the type shown in U.S. Pat. No. 6,978,982. However, many of these prior art tools have been clumsy to use and relatively inefficient.

More recently, bench-type tools, for example, the spring compressor is shown in U.S. Pat. No. 3,814,382, have been introduced to the marketplace. However, to remove the coil spring from a vehicle and then to insert it into a bench-type tool is time-consuming. Manual spring compressors are often used in the initial operation. Because the duty springs are helical in configuration and under load, it is not unusual for the manual tool to slip from the engaged coils of the spring.

3. OBJECTIVES OF THE PROJECT

- To improve handling and comfort during operation.
- To increase safety and reduce the time required for changing the strut tubes.

4. CAD MODEL

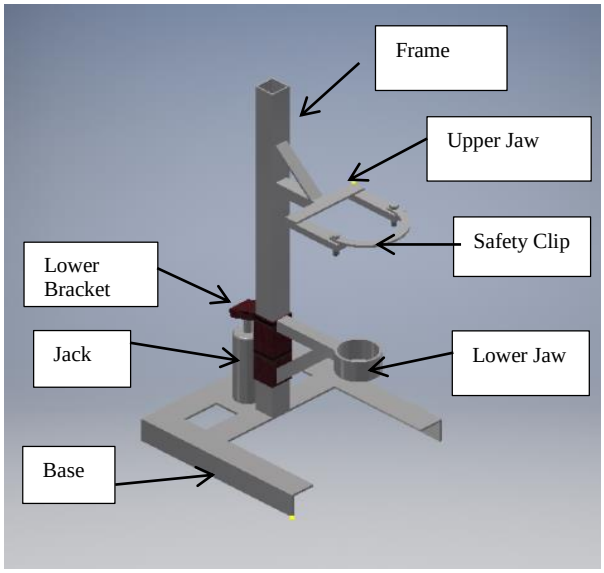

Fig. 1: Cad model

5. COMPONENTS AND FUNCTIONS

5.1 Frame

It acts as a supporting member. It is made up of Mild Steel to withstand the stress and load developed during compression of spring. It also holds the upper jaw and lower bracket. The upper jaw is welded to the frame. The frame is welded on the base. It has a square cross-sectional area (35mm×35mm).

5.2 Upper jaw

The basic function of the upper jaw is to restrict the upward movement of the spring while compressing from downward. The uppermost wire of the spring rests beneath the upper jaw.

5.3 Safety clip

The upper jack is accommodated with safety clip to prevent the spring coming out of the tool if a failure occurs.

5.4 Lower jaw

The Strut end part or the bottom part will be placed on the Lower Jaw. The jaw is provided with a safety lock to place spring at a fixed position. The lower jaw moves upward and downward when the force is applied from the hydraulic jack.

5.5 Lower bracket

It is a hollow square section (40mm×40mm) used to slide over the square frame. The moment of the bracket is achieved by the hydraulic jack.

5.6 Bottle Jack

To lift the weighted mass up to its capacity of lifting (2 Ton) by using pressurised hydraulic fluid.

5.7 Base

To withstand all the forces and spring load. It is made up of Mild Steel with a Tensile Strength of 445.4 N/mm^2.

Fig. 2: Working of coil spring compressor

6. CONCLUSION

- Manufacturing is successfully implemented.
- Comfortable in handling.
- The time required to compress the coil spring is comparatively short.
- Risk of injury is reduced.

7. ACKNOWLEDGMENT

We would like to express our gratitude and appreciation to all those who gave us the possibility to complete this report. A special thanks to our Guide Prof. N.N. Manchekar whose help, stimulating suggestions and encouragement, helped us to coordinate our paper especially in writing this paper. We would like to appreciate the guidance given by another supervisor as well as the panels especially in our paper that has improved our presentation skills by their comment and tips.

8. REFERENCES

[1] Willie R. Hutchins, entitle 'Coil Spring Compressing Tool', Pat. No. 4,930,751 05 June 1990.
[2] Charles T. Mattson, entitle 'Hand Tool Spring Compressor', Pat. No. 4,276,684(1981), 07 July 1981.
[3] Kenneth D. Kloster, entitle 'Spring Compressor Tool', Pat. No. 4,034,960(1977), 12 July 1977.
[4] Gang Jin, entitled 'Strut Spring Compressor', Pat. No. US 6, 978, 982, B1 27 Dec 2005.
[5] V. B. Bhandari (1994), "Design of machine elements", New York, Tata McGraw-Hill.
[6] R.S. Khurmi & J.K Gupta (2003), "A textbook of machine design", S. Chand & company.
[7] P.K. Mallick. "Static mechanical performance of composite elliptic springs".

