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April 15th, 1943.

R E P O R T  
of the

ORE DRESSING AND METALLURGICAL LABORATORIES.

Investigation No. 1387.

A Reclaiming Process for  
Ram Tank Volute Springs.

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BUREAU OF MINES  
DIVISION OF METALLIC MINERALS  
—  
ORE DRESSING AND  
METALLURGICAL LABORATORIES

CANADA  
DEPARTMENT  
OF  
MINES AND RESOURCES  
MINES AND GEOLOGY BRANCH

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Origin of Request and Object of Investigation:

As a follow-up to the investigative test work performed on defective Ram Tank volute springs by these Laboratories during 1942, in the latter part of that year Prof. J. U. MacEwan, Consultant to the Director of Metallurgy, Army Engineering Design Branch, Department of Munitions and Supply, Ottawa, Ontario, requested that the possibility of reclaiming decarburized and flattened volute springs be investigated. As suggested by Professor MacEwan, this task was pursued throughout the winter as a spare time assignment, in between more urgent investigations.



Description of Work:

It was concluded that most spring failures were due to decarburization. This has been covered in Report of Investigation No. 1270, dated April 12, 1942.

Controlling the shape of the spring is the most difficult part of its heat treatment and can only be done in a quenching press.

Recarburizing, quenching, and drawing are done in accordance with standard practice. (See P. M. Lab. Report No. 5431, September 9, 1942, and Report of Investigation No. 1303, September 21, 1942).

Should the reclamation of volute springs be undertaken on a large scale, the present report could serve as a starting point in designing and building the required machine. Figures 1 to 4 (on Pages 3 to 6 hereof), with their brief explanatory notes, illustrate the successive stages of the process.

Dies -

The plaster mould technique can be used to develop the dies. A spring of perfect shape is selected and the space between its leaves is filled with wax. The spring is coated with oil and placed in a box. Plaster of paris is poured in and allowed to set. The box is turned over and the bottom removed. The inside of the spring is oiled and plaster is poured in. This will give plaster replicas of the inside and outside of the spring. After the rest of the plaster is carved down, the two dies may be cast in grey iron, using the plaster patterns. Channels for quenching oil may be cut in the plaster pattern. A slight draft will also be cut on the plaster pattern, to allow easy seating of the spring in the die.

Frame -

A welded channel iron frame can be made to suit available equipment.

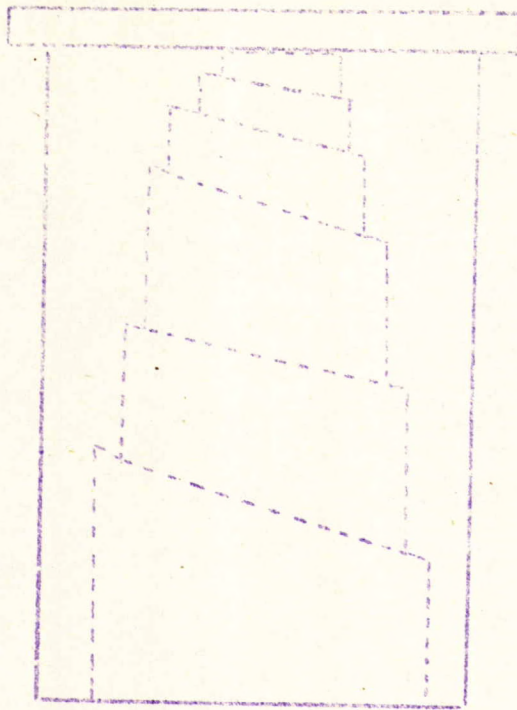
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(Figures 1 to 4 follow, on Pages 3 to 6)

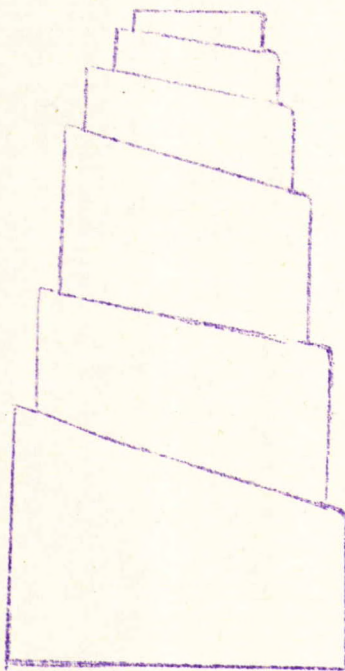


Figure 1.

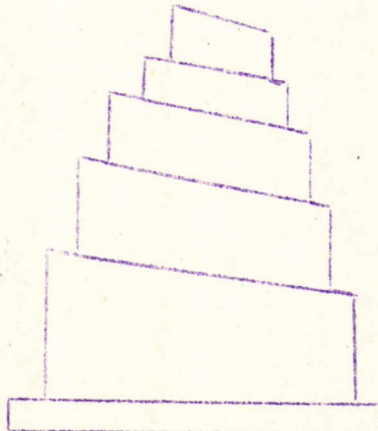


The Top Die Needs 35" Travel  
To Allow Placing of Spring  
High Pressure Stroke of 3"  
-Remaining 32" is Not Under  
Load.

A.



B.



C.

Figure 1. -  
A. Top Die.  
B. Spring.  
C. Bottom Die.



Figure 2.

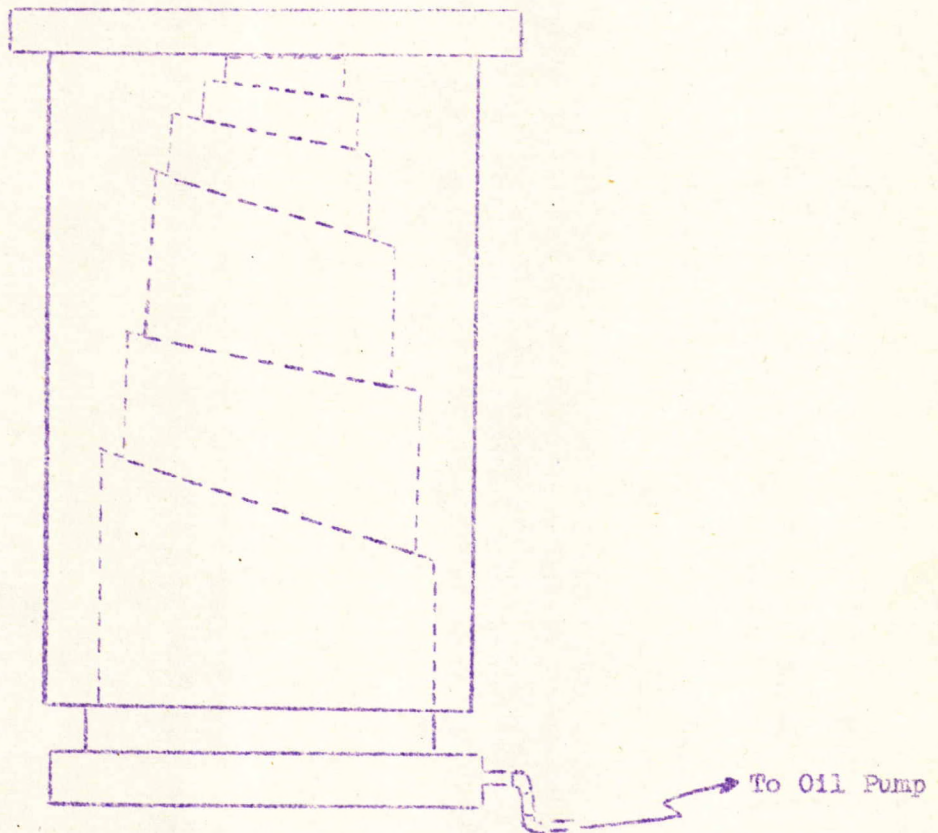


Figure 2.- Dies Closed on Spring.



Figure 3.

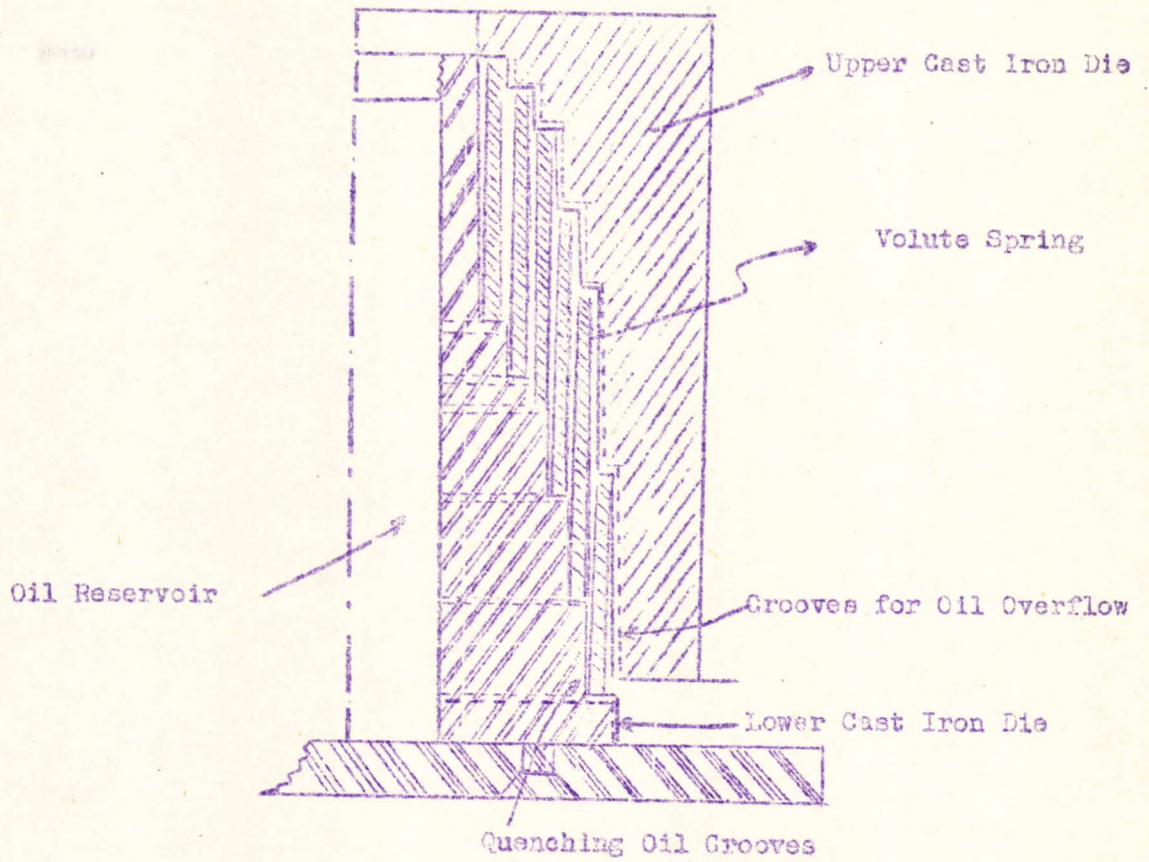


Figure 3. - Section of Quenching Dies.

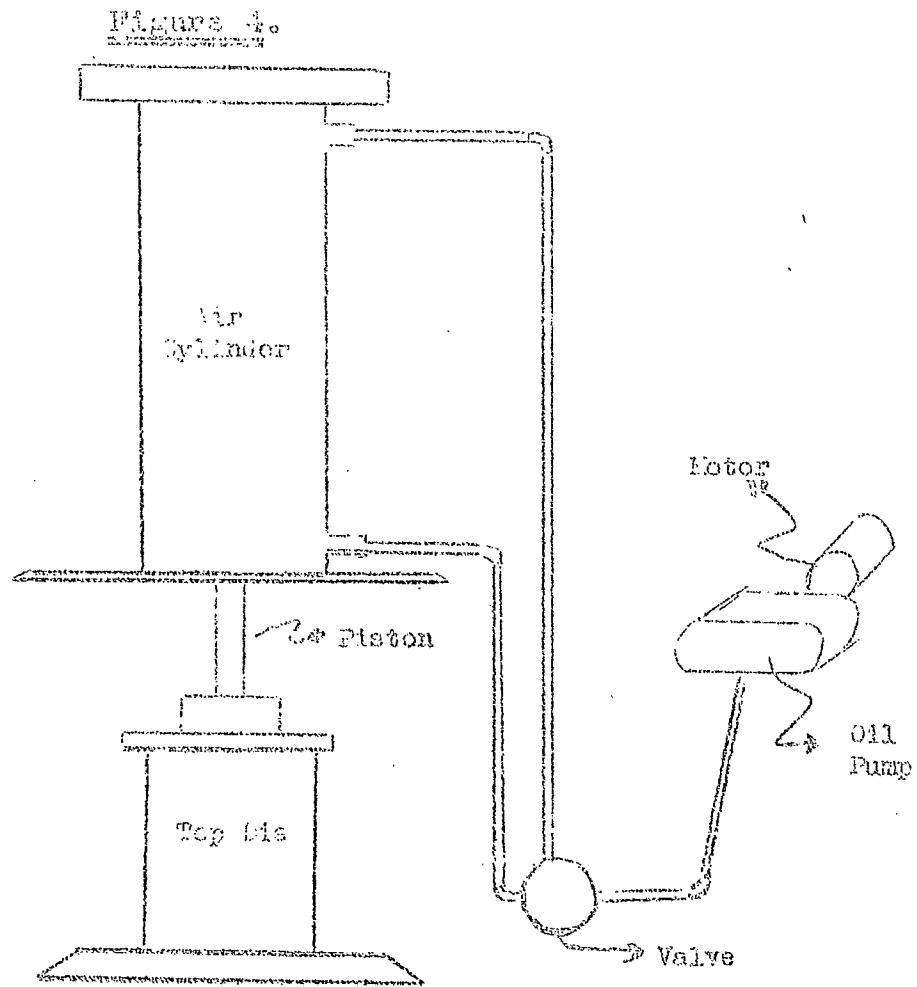


Figure 4.- Pneumatic System.

1. Air Pressure Raises Die.
2. Spring Loaded on Bottom Die.
3. Cylinder Opened to Air-Die Drops.
4. As Top Die Comes to Rest on Spring, Air Pressure Builds up and Spring is Compressed to Proper Shape.

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