File.

FILE COPY

OTTAWA December 7th, 1942.

REPORT

of the

ORE DRESSING AND METALLURGICAL LABORATORIES.

Investigation No. 1334.

(M. & S. No. 9/D)

An Examination of Some Universal Carrier Bogey Wheel Springs.

(Copy No. 10.)

BUREAU OF MINES
DIVISION OF METALLIC MINERALS

ORE DRESSING AND
METALLURGICAL LABORATORIES

CANADA
DEPARTMENT
OF
MINES AND RESOURCES
MINES AND GEOLOGY BRANCH

O T T A W A December 7th, 1942.

REPORT

of the

ORE DRESSING AND METALLURGICAL LABORATORIES.

Investigation No. 1334.

(M. & S. No. 9/D)

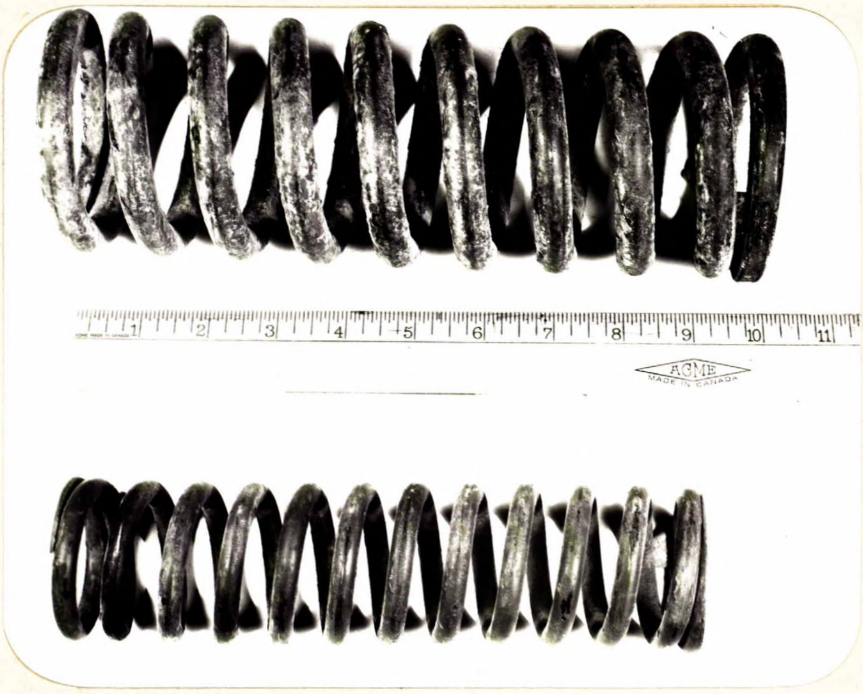
An Examination of Some Universal Carrier Bogey Wheel Springs.

Origin of Request and Object of Investigation:

On September 2nd, 1942, Prof. J. U. MacEwan, Assistant to the Director of Metallurgy, A.E.D.B., Department of Munitions and Supply, Ottawa, Ontario, submitted several bogey wheel springs for an investigation of their physical properties. These springs are used in the running gear suspensions of Universal Carriers.

Description of Springs Received:

Figure 1.



TWO OF THE SPRINGS RECEIVED.

(The small spring is used inside the larger).

Three lots of springs were received. One lot was new and unused. A second lot was reported to have run 7,000 miles satisfactorily. The third lot was reported to have been exposed to a brine atmosphere on the Atlantic Coast.

Tests of Spring Quality:

Next to actual proving ground conditions, the fatigue test gives the best measurement of spring quality. These laboratories are not yet equipped to perform tests of this type. No acceptance of springs should be made without

(Tests of Spring Quality, cont'd) -

fatigue testing to assure that the manufacturing process is satisfactory.

The two tests most closely related to fatigue strength of springs are those of decarburization and hardness.

Mechanical Tests:

Mechanical tests of the springs were performed as shown hereunder. Note that the free height of the spring is reduced in service. The height of the fully compressed spring remains about the same. It was noted that the used springs were warped as if non-axial loads had been applied. The small springs showed a significant reduction in the load to deflect one inch. This might have been caused by a reduction in effective diameter due to corrosion.

SMALL SPRINGS.*

Property	New	7,000 Miles Service	Atlantic Coast Service
Free height as received, inches	9.1875	8.875	8.875
Perm. set after bottoming, inches	0.35	0.146	0.156
Load to deflect one inch, in pounds	207	196.7	201.4
Height at 1,200-pound load, inches	4.286	4.306	4.273
*Number of results - - - - -	7	12	16

LARGE SPRINGS.*

Free height	10.331	9.7125	10.098
Load to deflect one inch, in pounds	445	446	448
Height when bottomed, inches	5.3125	5.294	5.266
Perm. set after bottoming, inches	0.0625	0.03125	0.0254
*Number of results - - - - -	6	12	16

* Property values given are averages of results.

Microstructure:

Figure 2.

X1000, nital etch.

Small Spring.

Rockwell 'C' hardness, 44.

Figure 3.

X1000, nital etch.

Large Spring.

Rockwell 'C' hardness, 49.

NEW SPRINGS.

Figure 4.

X1000, nital etch.

Small.

Rockwell 'C', 43.

Figure 5.

X1000, nital etch.

Large.

Rockwell 'C', 47.

7,000-MILE SPRINGS.

(Microstructure, cont'd) -

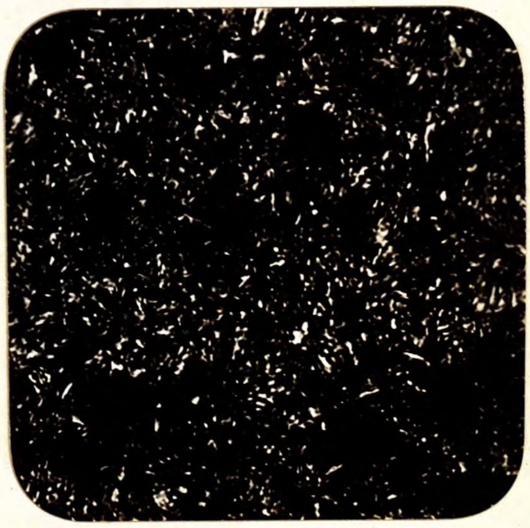
<u>Figure 6.</u>

X1000, nital etch.

<u>Small.</u>

Rockwell 'C', 44.

<u>Figure 7.</u>



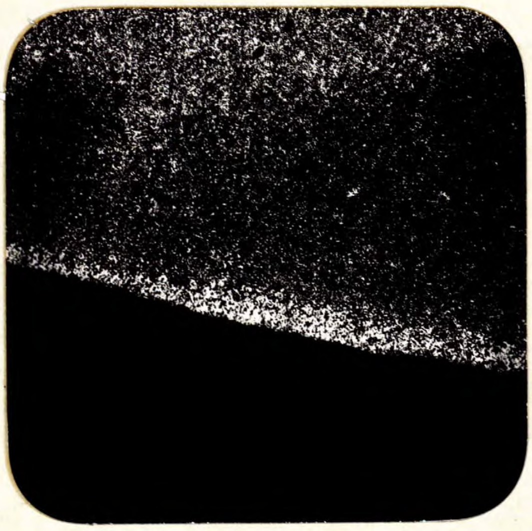
X1000, nital etch.

<u>Large.</u>

Rockwell 'C', 47.

<u>BRINE-EXPOSED SPRINGS.</u>

<u>Figure 8.</u>



X100, nital etch.

<u>Small.</u>

<u>Figure 9.</u>

X100, nital etch.

<u>Large.</u>

<u>EDGE OF NEW SPRINGS.</u>

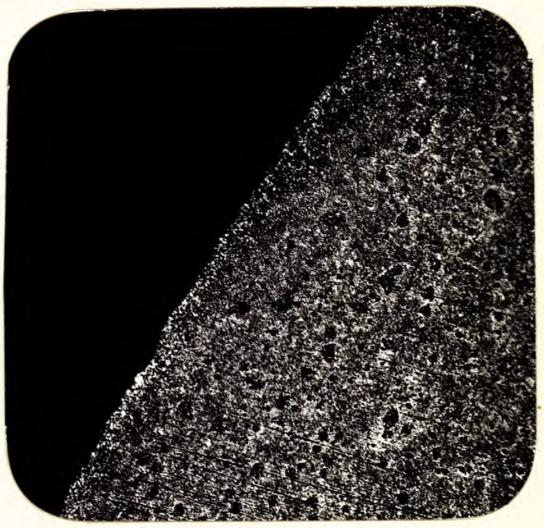
(Microstructure, cont'd) -

Figure 10.

X100, nital etch.

Small.

Figure 11.

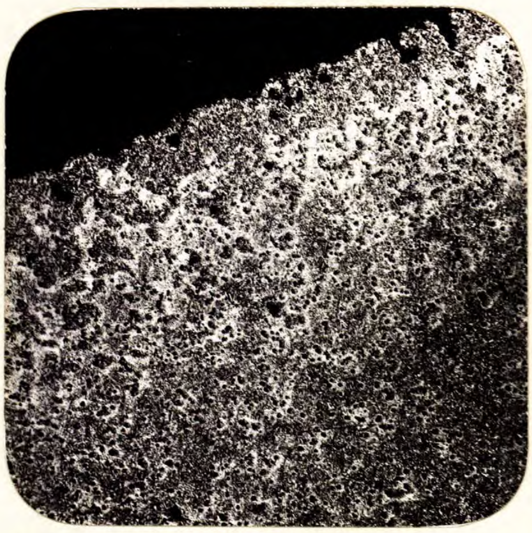


X100, nital etch.

Large.

EDGE OF 7,000-MILE SPRINGS.

Figure 12.



X100, nital etch.

Small.

Figure 13.

X100, nital etch.

Large.

EDGE OF BRINE-EXPOSED SPRINGS.

CONCLUSIONS:

This metallurgical examination will serve as a reference in case defective springs are encountered.

All springs have been properly heat treated, to a hardness generally recommended for springs of this type.

Slight decarburization is evident on most of the springs. Apparently the surface was ground but not deeply enough to remove all of the decarburization.

ooooooooooo
ooooo
o

HHF:GHB.