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O T T A W A April 15th, 1942.

R E P O R T
of the
ORE DRESSING AND METALLURGICAL LABORATORIES.

Investigation No. 1203.

Investigation of a Dominion Foundries
and Steel Limited Towing Hook.

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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:

On April 1st, 1942, under Analysis Requisition No. O.T. 220, Mr. R. Boulton, of the Inspection Board of the United Kingdom and Canada, 58 Lyon Street, Ottawa, Ontario, submitted a towing hook for examination. This hook was cast by the Dominion Foundries and Steel Limited, Hamilton, Ontario, from Heat No. 3668. An X-ray examination was requested. The chemical analysis, physical properties, and microstructure were also checked.

Macro-Examination:

The base of the casting submitted for examination was badly pitted. This is shown in Figure 1.

Figure 1.



PHOTOGRAPH OF BASE OF TOWING HOOK.
(About $\frac{1}{2}$ size).

Note pits.

X-Ray Examination:

X-ray examination was carried out at the National Research Council, Ottawa. This examination did not disclose any unsoundness.

Physical Tests:

A tensile bar 0.282 inch diameter was obtained for physical testing. The results of this test are given in Table I.

Table I. - Physical Tests.

	<u>Obtained</u>	<u>Specified</u>
Tensile strength, p.s.i.	- 86,400	78,000 to 90,000
Yield strength, p.s.i.	- 57,600	40,000 min.
Elongation in 1 inch, per cent	- 27	--
Reduction in area, per cent	- 29.4	--
Vickers Pyramid No.	- 169	

Chemical Analysis:

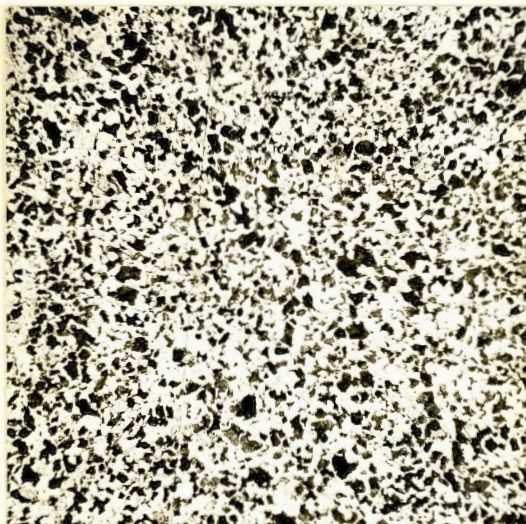
The chemical analysis of the metal in the hook is as follows:

		<u>Per cent</u>
Carbon	-	0.30
Manganese	-	0.73
Silicon	-	0.44
Sulphur	-	0.032
Phosphorus	-	0.021

Microscopic Examination:

The microstructure of the metal in this hook is illustrated in Figure 2. It is quite normal.

Figure 2.



X100, nital etch.

PHOTOMICROGRAPH.

Discussion of Results:

The physical specifications have been met and the microstructure indicates proper heat treatment practice. Evidently the method of moulding is correct since the X-ray failed to reveal any unsoundness.

The appearance of the casting, however, leaves much to be desired. It would indicate that there might be some carelessness in moulding or pouring. While in this case it

(Discussion of Results, cont'd) -

did not affect the quality of the casting, there is always greater risk of producing defective castings when such conditions exist.

Conclusions:

1. The casting is sound.
2. The physical specifications were met.
3. Heat treatment practice was correct.

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