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MINES BRANCH INVESTIGATION REPORT IR 58-31

METALLURGICAL EXAMINATION OF MENDED
FOURDRINIER WIRE CLOTH.

by

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Physical Metallurgy Division

01-7989321

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FOURDRINIER WIRE CLOTH.

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G. W. Toop^{*} and J. C. Edwards^{**}

SUMMARY OF RESULTS

The mended warp wire examined had given full normal wear during one and one-half days' service.

The body of the wire cloth sample remote from the mend exhibited approximately one-half normal life expended.

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INTRODUCTION

On February 11, 1958, a sample of 68 x 52 mesh fourdrinier wire cloth was submitted to the Physical Metallurgy Division by the Capital Wire Cloth and Manufacturing Company, Limited, Ottawa, Ontario. It was stated that the wire cloth had been in service for $1\frac{1}{2}$ days and the sample exhibited excessive wear on and about a mended warp wire.

The extent of wear in the proximity of the mend was to be determined and compared with the overall wear found on the sample.

MICROSCOPIC EXAMINATION

The mended warp wire and the adjacent wire cloth were photographed, Figure 1, and specific worn knuckles were selected for subsequent micro-examination, as shown in Figure 2. The mended area was then cut and each specimen was mounted and polished so that the cross sections of the selected knuckles could be photomicrographed.

Figures 3 and 4 show the worn knuckles on the mended wire and Figure 5 shows a worn knuckle on an adjacent warp wire.

The overall wear of the cloth remote from the mend is shown in Figure 6. Figure 7 exhibits a typical worn knuckle from this area.

DETERMINATION OF PERCENT WEAR OF THE KNUCKLES

It is understood that, in practice, full normal life of a

fourdrinier wire is reached after about 50 percent of the warp diameter has been removed from the knuckles. In order to compare the percent wear of the mended area with that of the body of the cloth, it is necessary to compare the volume of metal removed in both cases.

A typical warp wire was stripped from the wire cloth sample, one of the knuckles was projected on a screen with an optical comparator, and a tracing of the knuckle profile was made. From the geometry of the knuckle, the volume of metal removed as a function of diameter removed was calculated. The volume of metal removed with 50 percent diameter reduction was taken as 100 percent normal life, since it is understood that this is the point where most wires are removed from the machine. Thus, the percent of normal life expended (or percent wear) could be determined for any depth of wear found on the cloth sample.

The percent of the original warp diameter removed by wear was determined for each microsection as follows: The measurements, in millimetres, on the photomicrographs were made along a line perpendicular to and bisecting the flat of each knuckle to compensate for any non-perpendicularity of the knuckle to the plane of section. In some instances, where wire wear was severe, it was necessary to project the circumference and radii. Table 1 gives the measurements thus obtained.

Table I.

Photomicrograph	Remaining thickness of warp wire at worn knuckle, mm	Calculated original wire diameter, mm [*]	Percent diameter removed	Percent wear calculated on a volume basis
Figure 3	30	64	53.1	111
4	41.5	65	36.2	54
5	45.5	69	34.1	48
7	43.0	64	32.8	45

* These measurements were made on the photomicrographs at a magnification of X320. To obtain true dimensions, these measurements must therefore be reduced by the same factor.

DISCUSSION

Examination of Figures 1 and 2 indicates relatively heavy wear on and about the mended warp wire. Some distortion of the adjacent warp wires and spreading of the shute wires in the mend area are also apparent. The depreciated mend area is confined by surrounding wire cloth exhibiting less wear.

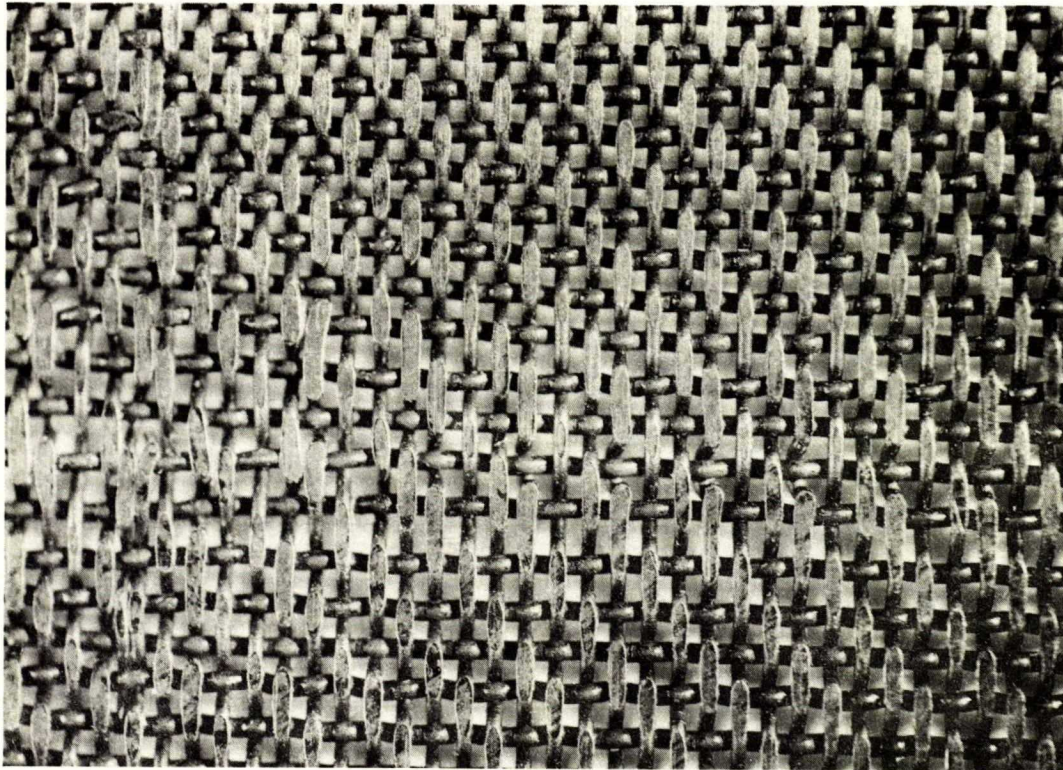
One of the knuckles on the mended warp wire, Figure 3, showed 111 percent wear or full normal life expended. The next knuckle along the mended wire, Figure 4, showed 54 percent wear. A knuckle adjacent to the mend, Figure 5, showed 48 percent wear. The body of the cloth, Figure 7, exhibited 45 percent wear or just under one-half normal life expended.

CONCLUSIONS

In the sections examined, the mended warp wire exhibited a maximum of 111 percent wear, or more than full normal life. This wire was supported by surrounding wire cloth exhibiting decreasing degrees of wear. The body of the cloth sample showed 45 percent wear, or approximately one-half normal life expended.

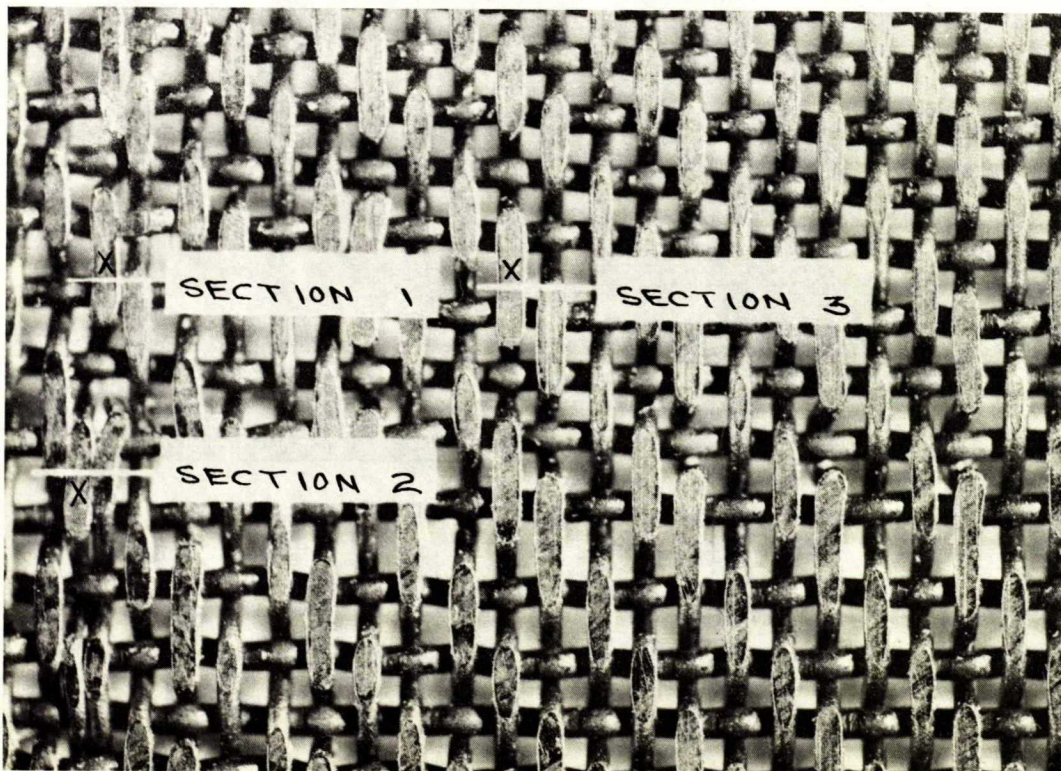
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(Figures 1-7 follow,
on pages 5 to 8.)



X10.

Fig. 1. - Mended warp wire left, and adjacent wire cloth.



X16.

Fig. 2. - Mended warp wire and adjacent cloth. The section locations are shown and the warp knuckles sectioned are designated with crosses.

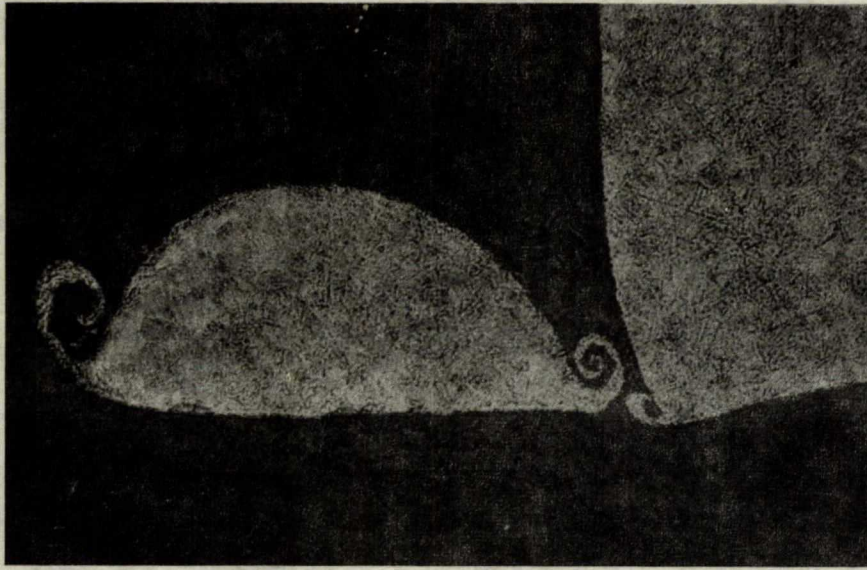


Fig. 3. - Section 1; worn knuckle on mended warp wire.
(X320. Etched 4 seconds in alcoholic ferric chloride.)

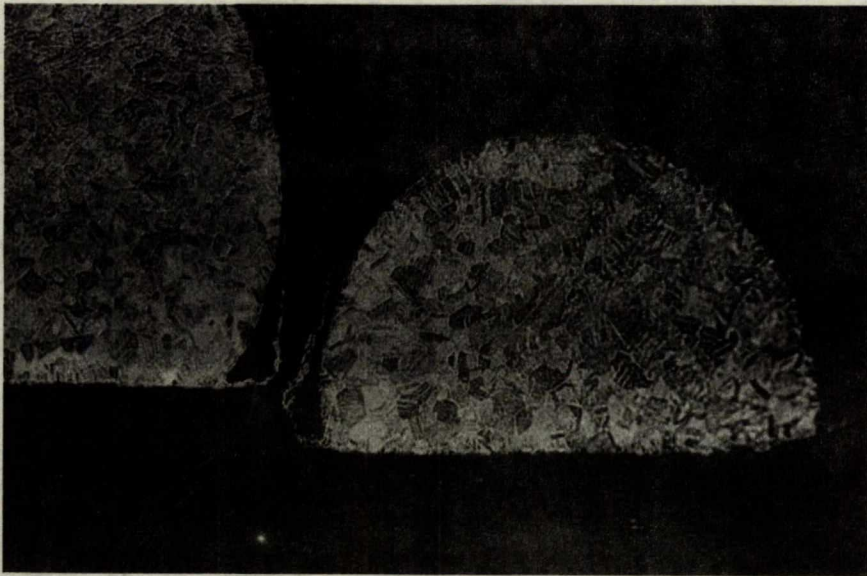


Fig. 4. - Section 2; worn knuckle on mended warp wire.
(X320. Etched 4 seconds in alcoholic ferric chloride.)

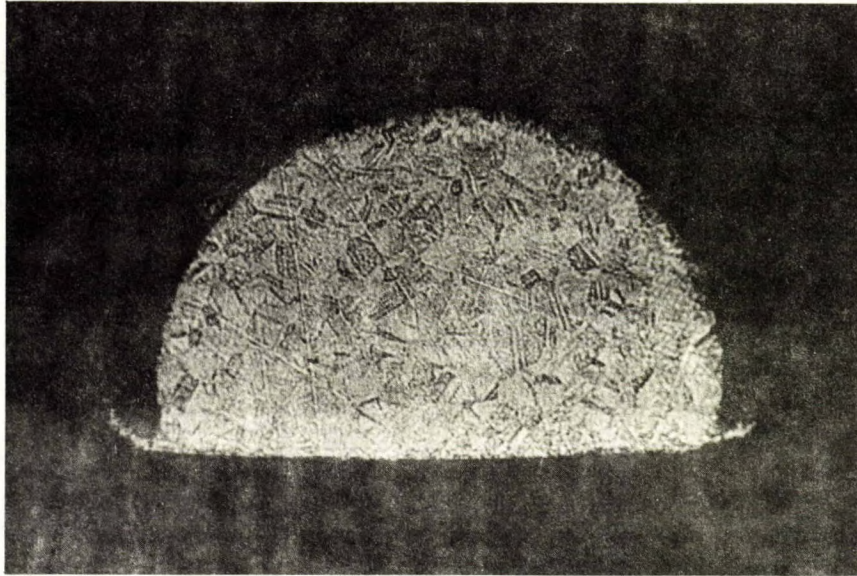


Fig. 5. - Section 3; worn knuckle on warp wire in proximity of mend.
(X320. Etched 4 seconds in alcoholic ferric chloride.)



X16.

Fig. 6. - Body of the wire cloth sample remote from the mend.

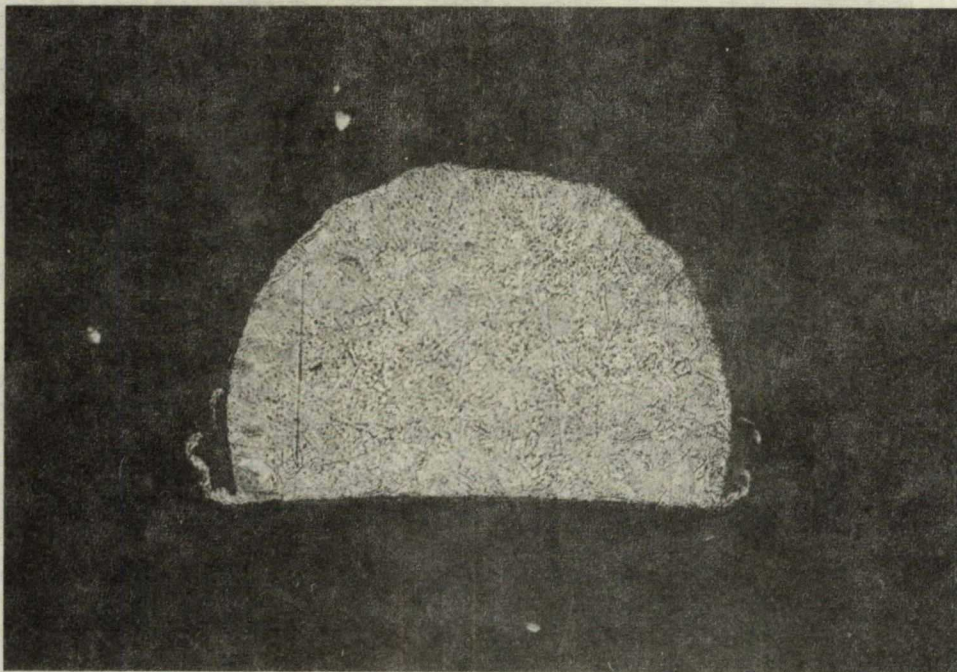


Fig. 7. - Typical worn knuckle from the body of the cloth.
(X320. Etched 4 seconds in alcoholic ferric chloride.)

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