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AD A951237

Report No. 312/63
Watertown Arsenal

January 3, 1935

Pitted Pawls, Fuse Setter M5

Reference: Letter C. O. 471.835/569, dated Oct. 25, 1934

Material

Two pitted and one new left hand, two pitted and one new right hand pawls for Fuse Setter M5 assigned to the 62nd A. A. C. A., Fort Totten, N. Y., were submitted to ascertain the cause of pitting.

Conclusions

1. The pitting and markings of the unserviceable pawls indicated corrosion, probably the result of improper cleaning after use or insufficient protection while not in use.

2. The steel was of good quality, commercially well forged and heat treated.

3. The hardness probably varied somewhat from piece to piece as the micro structure of the various pawls showed variations in the amounts of martensite and troostite. However, the structure of each pawl was the same throughout.

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Identification Marks

Left Hand	Right Hand
A 27330 (new)	A 27304 (new)
A 27330 (unserviceable)	A 27304 (unserviceable)
A 27274 "	A 27273 "

Discussion

The steel was clean in all six specimens submitted. The non-metallics present were small and well separated. There were no segregation of inclusions near the pits. They, therefore, were not a contributing cause of the pitting.

The microstructure of all was martensite and troostite and the grain size was small. This indicates that the forging and heat treating temperatures were satisfactory. The variations in the amounts of martensite and troostite which differ somewhat from specimen to specimen, indicates that the method of quenching varied somewhat from piece to piece. This would cause variations in hardness. (No hardness determinations were made).

The structural differences in the individual specimens were not enough to cause pitting.

The appearance of the pitted portion is of repeated cycles of corrosion and light abrasions and not primarily of wear caused by being dug or jammed by something hard, as no distorted crystals were found.

Examination of the pawls in storage at Watertown Arsenal showed no rusting or pitting. Some of these pawls were in the "as forged" condition and had just been received from the makers. Another lot were finished machined, heat treated, but unpolished. Another lot in storage considerably over a year were polished and were still bright. This indicates that with reasonable care the pawls should remain in serviceable condition for a long time.

Figure 1, is a photograph showing the pitted condition of the unserviceable pawls, together with new ones.

731-215

Figure 2, at X100, is an unetched section of pawl #A 27304. This is typical of all six. The non-metallics are small and well separated. MP-18

Figure 3, at X1000, etched with 1% Nital is a section of pawl #A 27304 taken at the bottom of one of the pits. No structural cause of the pitting is visible. This is typical of all the pawls submitted, except for the variations inthe amounts of martensite and troostite. (Some of the specimens contained considerably more troostite.) MP-19

Respectfully submitted,

H. G. Carter

Figure 1

Photograph showing pitted condition of the unserviceable pawls, together with new ones.

731-215

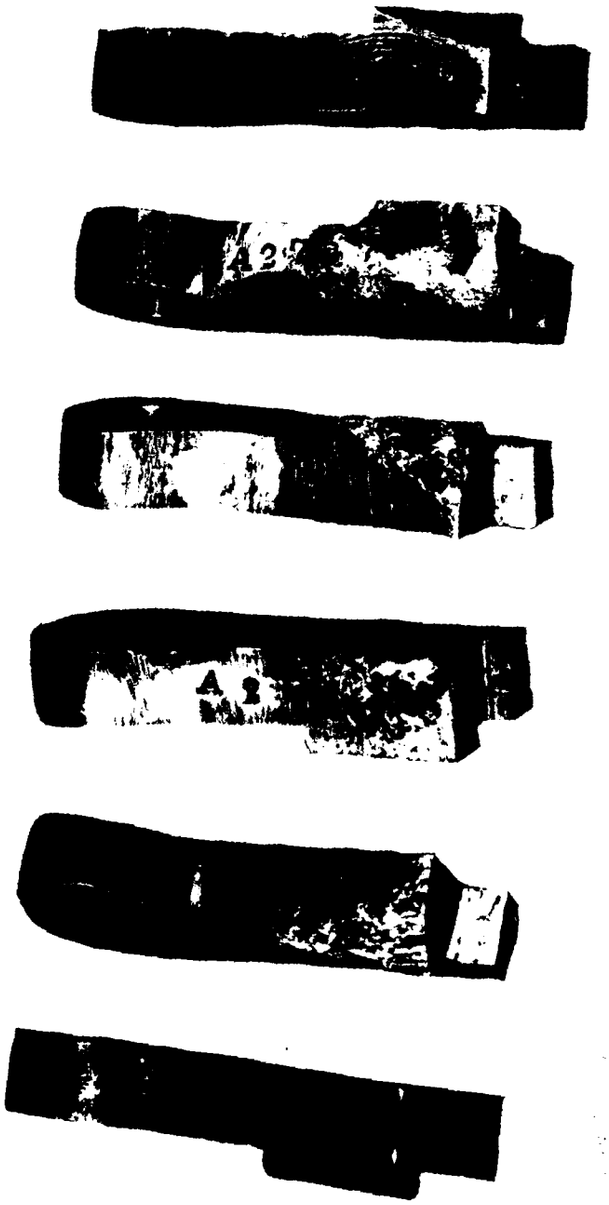

Figure 2

X100 unetched pawl #A 27304 Typical of all six. Non-metallics are small and well separated.

MF 18

Figure 3

X1000 1% Nital, pawl #A 27304 bottom of one of the pitts. No distortion non-structural cause of pitting. Typical of all six except as to the amount of martensite and troostite.

MF 19