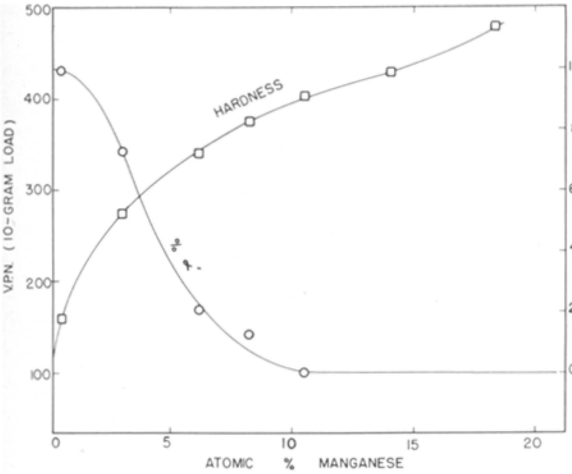

Fig. 1—Graph of Vpn hardness vs composition for as-quenched sintered alloy powders, and pct α' vs composition for the quenched specimens.

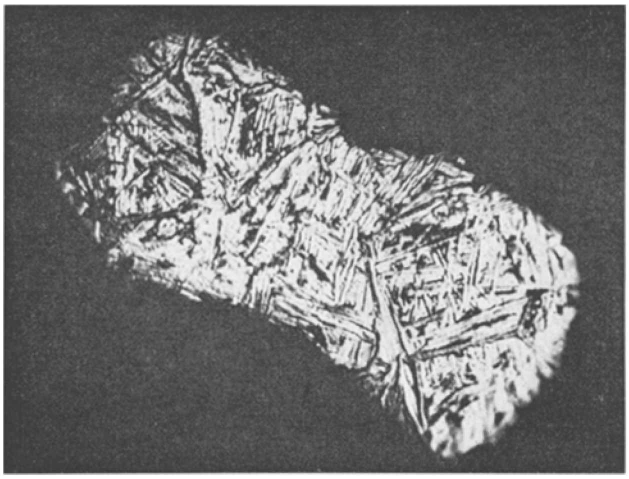

Fig. 2—Micrograph showing α' structure in a 0.37 pct Mn alloy, etched in 2 pct HF plus water with HNO_3 rinse. X800.

investigators[3,4] working on lump samples reported the highest composition producing α' to be 5.6 pct Mn. A similar discrepancy in the result of quenching experiments has been observed in the Ti-Fe system,[5] and is apparently due to the size of the specimen.

A micrograph of the typical martensitic structure in low manganese alloys is shown in Fig. 2. Higher manganese alloys showed a less pronounced martensitic pattern.

Quenched and Tempered Alloys—Maykuth et al.[3] have reported the sluggishness of decomposition reactions below eutectoid temperature, 550°C. It seemed worthwhile, therefore, to conduct experiments in an effort to speed the tempering reactions in quenched alloys. These experiments involved a) cold working by percussion between tempering treatments and b) oscillation 15°C above and below the eutectoid temperature during heat treatment. However, in both series of experiments it was found that after the initial breakdown of the retained β phase during the earliest stages of tempering, no further decomposition could be induced.

The amount of γ phase produced on tempering is, as would be expected, greater at higher manganese contents, but it does not exceed an estimated 10 pct even in the 18.2 pct Mn alloy.

Acknowledgments

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Technical Note

New Vanadium Boride of the Composition V_3B_4

by D. Moskowitz

IN the course of a general investigation of boride systems, sponsored by the Office of Naval Research, various vanadium boride powders of relatively good purity were prepared which could be used for a determination of the phases present.

The X-ray pattern of one of these lots showed, in addition to the known VB[1] and VB_2[2] phases, an additional phase, almost certainly of composition V_3B_4, isomorphous with Cr_3B_4, Cb_3B_4, Ta_3B_4, and Mn_3B_4. Its pattern fitted in well with the indices worked out by Kiessling for Mn_3B_4.[3] The unit cell for this new compound is orthorhombic, with the dimensions $a = 3.030Å$, $b = 13.18Å$, $c = 2.986Å$, $V = 119.2Å$.[3] Table I lists the X-ray diffraction data for V_3B_4.

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Table I. V_3B_4 X-Ray Diffraction Data*

h k l	d, Observed	2θ, Observed	Intensity	d, Calculated
1 1 0	2.981	29.95	Medium	2.953
0 3 1	2.466	36.40	Strong	2.469
0 6 0	2.199	41.00	Weak	2.196
1 0 1	2.132	42.35	Weak	2.127
1 2 1	2.030	44.60	Strong	2.021
1 5 0	2.002	45.25	Strong	1.988
1 4 1	1.792	50.9	Weak	1.787
0 7 1	1.594	57.8	Weak	1.623

* CuKα radiation. The unit cell is orthorhombic: $a = 3.030Å$, $b = 13.18Å$, and $c = 2.986Å$.

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