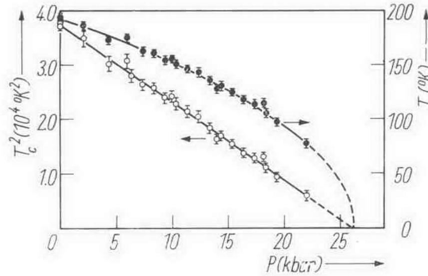

Fig. 2. The $T_C(P)$ and $T_C^2(P)$ dependences for alloy No. 5 ($x = 0.171$)

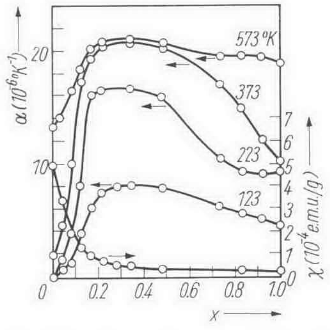

Fig. 3. The dependences of the linear expansion coefficient α and magnetic susceptibility χ at 573 °K on alloy composition

this specimen had the lowest T_C and that for the alloy with similar composition (No. 4) investigated under the same (quasi-hydrostatic) conditions the $T_C(P)$ dependence deviates from the linear one only slightly and lies within the experimental error.

It is seen in Fig. 2 that the $P(T_C)$ dependence for the alloy No. 5 is nearly parabolic in the investigated temperature range. The very dependence

$$\frac{dT_C}{dP} = -\frac{A}{T_C},$$

where A is the constant given by Wohlfarth's approximation [4] of a very weak itinerant ferromagnetism (in our case $A \approx 700$ deg^2 kbar^{-1}). The fact that such an approximation may be used to describe the temperature dependence of magnetization of the system $Fe_{65}(Ni_{1-x}Mn_x)_{35}$ for $0.15 < x < 0.3$ was already illustrated in [5].

The results of measurements of the linear expansion coefficient α at different temperatures and the isotherm of magnetic susceptibility χ at 573 °K (in the paramagnetic range) are given in Fig. 3. It follows from Fig. 3 that on substituting Ni by manganese α increases sharply near the composition $Fe_{65}Ni_{35}$ and decreases more smoothly near $Fe_{65}Mn_{35}$ at all temperatures. For χ one can observe a sharp drop in the $0 < x < 0.3$ range and a weak dependence on concentration at higher Mn contents. Thus it is seen from Fig. 3 that both the functional dependences $\alpha(x)$ and $\chi(x)$ are different in the regions $x \lessapprox 0.3$ and $x \gtrapprox 0.3$ up to temperatures which are considerable higher than those of magnetic ordering of the investigated samples (the boundary between these regions is conventionally shown in Fig. 1 by a dashed line). All the investigated alloys had the same f.c.c. lattice at all temperatures, so the difference in the behaviour of the $\alpha(x)$ and $\chi(x)$ dependences in the mentioned regions may be due to the difference in the electron configuration in the paramagnetic state of the samples which are ferromagnetics ($x \lessapprox 0.3$) and antiferromagnetics ($x \gtrapprox 0.3$) at low temperatures.

It is seen from Fig. 1 that a region of alloys paramagnetic down to temperatures close to 0 °K, may appear or extend with increasing pressure. Thus, for example, extrapolation gives $T_C = 0$ °K at $P < 30$ kbar (Fig. 2) for the alloy

No. 5. Similar speculations are true for Fe–Ni–Mn antiferromagnetic alloys as well. The number of the s + d external electrons is considered as a criterion of a magnetic ordering to exist in alloys on the basis of d-metals in some papers [6, 7]. High pressure does not change this number in our Fe–Ni–Mn alloys, but may transform, for example, the state of alloy No. 5 from ferromagnetic at temperatures below 190 °K to paramagnetic at temperatures close to 0 °K. This fact seems to be unfavourable for the use of the number of external electrons as a criterion of magnetic ordering in alloys of d-metals.

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