CLAIMS

1. A method for manufacturing a Co-based alloy structure having composition that has 2% to 5% of Al, 17% to 25% of W, 0.05% to 0.15% of C, 20% to 35% of Ni, 6% to 10% of Cr, and 3% to 8% of Ta in terms of a mass ratio, with a balance being Co besides unavoidable impurities, the Co-based alloy structure comprising:

a matrix phase (γ phase) having an fcc structure and containing mainly Co; and

a precipitated phase (γ' phase) that contains an intermetallic compound having an $L1_2$ fcc structure of $Co_3(Al,W)$ or $[(Co,X)_3(Al,W,Z)]$ in terms of an atomic ratio, in that X and Z in the intermetallic compound are alloy components selected from at least one of groups (I) or (II), wherein the group (I) is composed of B, C, Y, La and mischmetal, and the group (II) is composed of Ni, Cr, Ti, Fe, V, Nb, Ta, Mo, Zr, Hf, Ir, Re and Ru, and that is dispersively precipitated in the matrix phase,

the Co-based alloy structure being configured to comprise the precipitated phase (γ' phase) having a grain size in a range of 10 nm or more and less than 50 nm, and grains of the precipitated phase (γ' phase) being uniformly disposed and precipitated, and to have a precipitation amount of 40 vol% to 85 vol%,

wherein the method comprises:

a solution treatment step of performing a solution treatment on a precursor of the Co-based alloy structure; and

an aging treatment step of performing an aging treatment on the precursor of the Co-based alloy structure that has undergone the solution treatment,

the aging treatment step including a first aging treatment step and a second aging treatment step performed after the first aging treatment step,

an aging temperature of the second aging treatment step being set to be higher than an aging temperature of the first aging treatment step.

2. The method of claim 1, wherein

a temperature of the solution treatment is 1100°C or more,

the aging temperature of the first aging treatment step is 500°C to 700°C, and the aging temperature of the second aging treatment step is 600°C to 800°C.

3. The method of claim 1 or 2, wherein

the Co-based alloy structure is configured as an additive manufacturing object made from a powder.

4. The method of claim 1 or 2, wherein

the Co-based alloy structure is configured as a powder HIP forged object made from a powder.

5. The method of claim 1 or 2, wherein

the Co-based alloy structure is configured as a forged object.

6. The method of claim 1 or 2, wherein

the precursor of the Co-based alloy structure is manufactured by additive manufacturing.

7. The method of claim 1 or 2, wherein

the precursor of the Co-based alloy structure is manufactured by forging.

8. The method of claim 1 or 2, wherein

the precursor of the Co-based alloy structure is manufactured by powder HIP forging.