

Publication

**EP 0572780 A3 19940427**

Application

**EP 93105667 A 19930406**

Priority

DE 4211457 A 19920406

Abstract (en)

[origin: EP0572780A2] The invention relates to a process and to a device for thermal cleaning of metal strip surfaces during heating in continuous annealing lines, in particular for removing oil-containing coatings, while dispensing with alkaline and acidic cleaning solutions, chlorinated hydrocarbons, caustic alkalis and the like. The oil film is caused to evaporate by blowing with a hot hydrogen-nitrogen gas mixture, and the oil vapours are converted to CO and CO<sub>2</sub> by stoichiometrically adequate feeding of steam, so that the carburisation of the low-carbon annealing material, otherwise unavoidable in view of the existing high carbon potential, is avoided. By means of a circulation fan and of nozzles directed onto the strip surface, an impact flow is generated under which the vapour pressure of the oil film increases proportionally to the heating rate and the evaporating hydrocarbon compounds react with the steam fed in accordance with the heterogeneous and homogeneous water gas equilibrium. In this case, the circumstance is exploited that the blanketing gas temperature is already very high, but the temperature of the strip running in is still comparatively low. Because of this, and owing to the short residence time of the strip in the cleaning section, oxidation reactions on the strip surface and diffusion processes in the strip material are not yet activated. The evaporating oil film, whose maximum boiling point is not reached until just before the exit from the cleaning section, provides additional protection. The boiling curve and the distribution of the evaporation rate over the temperature are known, so that strip heating, blanketing gas throughput and circulation can be matched to the boiling properties of the oil residue. Pretreatment of the strip in tristream degreasing units or electrolytic degreasing units or other precautions against carburisation of the annealing material can be dispensed with; an appropriate blanketing gas circulation ensures that no carbon epitaxy occurs in the furnace chamber. The process is designed for the lowest possible pollution of the environment and is particularly suitable for the continuous heat treatment of thin strip cross-sections of ferrous materials such as fine sheet and very fine sheet, low-carbon grain-oriented and non-grain-oriented magnetic steel sheets, stainless steel sheets, strip of iron/nickel alloys and of non-ferrous metals such as alloys of titanium, copper, zinc and aluminium, whenever residues of fabrication aids such as oil and emulsion must be removed before annealing. After the evaporation of the oil film, pigments such as abraded metal and dust are blown off from the strip surface by the gas jet, and this counteracts the formation of pimples on the furnace support rollers and the formation of scratches on the underside of the strip. <IMAGE>

IPC 1-7

**C23G 5/06**; **C23G 5/00**; **B08B 3/02**

IPC 8 full level

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CPC (source: EP)

**B08B 3/022** (2013.01); **B21B 45/0284** (2013.01); **C23G 5/00** (2013.01)

Citation (search report)

- [Y] EP 0271135 A1 19880615 - PHILIPS PATENTVERWALTUNG [DE], et al
- [Y] DE 3734200 A1 19890427 - KLIRO BAU GMBH & CO KG [DE]
- [Y] EP 0231877 A2 19870812 - BELLMER GEB KG MASCHF [DE]
- [A] FR 2562562 A1 19851011 - STEIN HEURTEY [FR]
- [A] GB 2143254 A 19850206 - SCHLOEMANN SIEMAG AG

Cited by

PL421956A1; DE19840778A1; CN104759476A; CN108220585A; CN114060834A; CN114729413A; WO2013017783A1

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