Title: METHOD AND APPARATUS FOR THE SEPARATION OF SOLID PARTICLES HAVING DIFFERENT DENSITIES

Abstract: The invention relates to a method and apparatus for separating solid particles of different densities, using a magnetic process fluid. The solid particles are thoroughly mixed in a small partial flow of the process fluid. The small turbulent partial flow is added to a large laminar partial flow of the process fluid, after which the obtained mixture of the respective partial process fluids is conducted over, under, or through the middle of two magnet configurations, wherein the particles are separated into lighter particles at the top of the laminar process fluid and heavier particles at the bottom of the laminar process fluid, each of which are subsequently removed with the aid of a splitter. After that, furthermore, the particles of low density and the particles of high density are separated from the respective process streams, dried and stored. Finally, the process fluid from which the particles have been removed is returned to the original starting process stream. The method according to the invention is especially suitable, for example, for separating a mixture of polypropylene particles and polyethylene particles.
AMENDED CLAIMS
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1. A method for separating solid particles of different densities in a magnetic process fluid, characterised in that the solid particles that differ little in density are separated by first thoroughly mixing the solid particles to be separated in a small partial flow of the process fluid, which small turbulent partial flow is added to a large laminar partial flow of the process fluid, after which the obtained mixture of the respective partial process fluids is conducted over, under, or through the middle of two magnetconfigurations, wherein the particles are separated into lighter particles at the top of the laminar process fluid and heavier particles at the bottom of the laminar process fluid, each of which are subsequently removed with the aid of a splitter wherein furthermore the materials of low density and the materials of high density are separated from the respective process streams.

2. A method according to claim 1, characterised in that prior to mixing in the turbulent fluid stream, the solid particles are subjected to moistening with steam.

3. A method according to claim 1 or 2, characterised in that the turbulent particle stream is introduced at the height of the splitter.

4. A method according to any one of claims 1-3, characterised in that heavy particles settled in the process fluid stream are collected and removed at the bottom in a trough-shaped endless conveyor belt.

5. A method according to any one of claims 1-4, characterised in that a mixture of polypropylene particles having a density of 880–920 kg/m³ and polyethylene particles having a density of 930–960 kg/m³ are separated.

6. A method according to any one of claims 1-5, characterised in that the process fluid consists of a suspension of iron oxide particles.

7. A method according to any one of claims 1-6, characterised in that the smaller partial flow constitutes approximately 10% of the process fluid.
8. A method according to any one of claims 1-7, characterized in that as magnet a permanent magnet, electromagnetic or a superconducting magnet is used.

9. An apparatus (1) for separating a mixture of materials of little density differences in accordance with the method of any one of claims 1-8, characterized in that the apparatus (1) is provided with a mixing vessel (2) for the particles to be separated, which mixing vessel (2) is provided with a stirrer (3) and an outlet for a turbulent partial process stream (4) containing the particles, and laminators (5) and (6) for creating a laminar process stream (8) delimiting the turbulent partial process stream (4), followed by a magnet for magnetizing the laminar process fluid stream (8), and a splitter (10) for removing a process fluid stream containing the lighter particles (11) on the one hand, and the heavier particles (12) on the other hand, whereby there is an equidirectionally rotating endless belt (9) for maintaining the laminar process fluid stream (8), and an equidirectionally moving trough-shaped endless belt (13) for removing the settled heavier particles and for maintaining the laminar process fluid stream (8).

10. An apparatus according to claim 8, characterized in that the mixing vessel (2) tapers.

11. An apparatus according to claim 9 or 10, characterized in that the laminators (5) and (6) are provided at the feed side of the fluid stream.

12. An apparatus according to claim 9-11, characterized in that magnet (7) is a permanent magnet, an electromagnetic or a superconducting magnet.