of the capital expenditures over the operating expenditures (capex/opex). It is an object to provide a process and apparatus that may be easier to clean and maintain. It is an object to provide a process and apparatus that does not lead to decomposition nor any other substantial modification of the properties of the polymer to be devolatilised.

SUMMARY

The present disclosure thereto provides a devolatilization apparatus for removing volatiles from a polymer melt feed, the apparatus comprising:

- a devolatilization nozzle comprising an inlet part, a polymer distribution part comprising headers, and an outlet part comprising a number of apertures, configured to form polymer strands in a devolatilization vessel;
- a collector, configured to collect the polymer strands in the devolatilization vessel;
- a polymer outlet, configured to remove the collected polymer from the collector; and,
- a gas outlet, configured to remove the volatiles from the devolatilization vessel;

preferably characterized in that

the average aperture diameter is at least 0.5 mm and at most 8.0 mm; and,
the strand drop height is at least 1.0 m and at most 20.0 m.

In one aspect, the present disclosure thereto provides a devolatilization apparatus for removing volatiles from a polymer melt feed, the apparatus comprising:

- a devolatilization nozzle comprising an inlet part, a polymer distribution part comprising headers, and an outlet part comprising a number of apertures, configured to form polymer strands in a devolatilization vessel;
- a collector, configured to collect the polymer strands in the devolatilization vessel;
- a polymer outlet, configured to remove the collected polymer from the collector; and,
- a gas outlet, configured to remove the volatiles from the devolatilization vessel;

characterized in that

the average aperture diameter is at least 0.5 mm and at most 8.0 mm;
the average distance between adjacent apertures is at least 3.0 mm and at most 6.0 mm; and,
the strand drop height is at least 4.0 m and at most 20.0 m.

CLAIMS

1. Devolatilization apparatus for removing volatiles from a polymer melt feed, the apparatus comprising:
   - a devolatilization nozzle comprising an inlet part, a polymer distribution part comprising headers, and an outlet part comprising a number of apertures, configured to form polymer strands in a devolatilization vessel;
   - a collector, configured to collect the polymer strands in the devolatilization vessel;
   - a polymer outlet, configured to remove the collected polymer from the collector; and,
   - a gas outlet, configured to remove the volatiles from the devolatilization vessel;

   characterized in that

   the average aperture diameter is at least 0.5 mm and at most 8.0 mm;

   the average distance between adjacent apertures is at least 3.0 mm and at most 6.0 mm; and,

   the strand drop height is at least 4.0 m and at most 20.0 m.

2. Apparatus according to claim 1, wherein the average aperture diameter is at least 1.0 mm and at most 6.0 mm; more preferably is at least 1.5 mm and at most 4.0 mm; most preferably about 2.0 mm.

3. Apparatus according to any one of the preceding claims, wherein the strand drop height is at least 4.0 m and at most 8.0 m; most preferably about 6.0 m.

4. Apparatus according to any one of the preceding claims, wherein the apertures are arranged in a triangular grid.

5. Apparatus according to any one of the preceding claims, wherein the apertures are tapered apertures created by a water jet.

6. Apparatus according to any one of the preceding claims, configured such that the ratio of strand drop height / average aperture diameter is at least 0.5 m/mm to at most 6.0 m/mm; preferably at least 1.0 m/mm to at most 5.0 m/mm; preferably at least 2.0 m/mm to at most 4.0 m/mm; preferably about 3.0 m/mm.

7. Apparatus according to any one of the preceding claims, configured such that the ratio of average distance between adjacent apertures / average aperture diameter is at least

0.5 to at most 10.0; preferably at least 1.0 to at most 5.0; preferably at least 1.5 to at most 4.0; preferably about 2.0.

8. Apparatus according to any one of the preceding claims, configured such that the pressure in the devolatilization vessel outside the nozzle is at least 0.5 mbar abs and at most 500.0 mbar abs; preferably at least 1.0 mbar abs and at most 200.0 mbar abs; more preferably at least 1.2 mbar abs and at most 10.0 mbar abs; most preferably about 1.5 mbar abs.

9. Use of the devolatilization apparatus according to any one of claims 1 to 8, for reducing volatiles in a polymer melt feed.

10. Process for reducing volatiles in a polymer melt feed, comprising the steps of:
    - providing a polymer melt feed to a devolatilization apparatus according to any one of claims 1 to 8;
    - passing the polymer melt feed through the apparatus, thereby forming polymer strands in a devolatilization vessel;
    - collecting the polymer strands in a collector by letting the polymer strands drop over a strand drop height into the collector; thereby obtaining a devolatilised polymer in the collector and removed volatiles;
    - recovering the volatiles through a gas outlet of the devolatilization vessel; and,
    - recovering the resulting devolatilised polymer from the collector through a polymer outlet of the collector;

    preferably wherein the polymer melt viscosity is at least 100 000 cP and at most 5 000 000 cP and the average throughput per aperture is at least 5 g/h and at most 100 g/h.

11. The process according to claim 10, wherein the polymer melt viscosity at the inlet part is at least 100 000 cP and at most 5 000 000 cP; preferably at least 200 000 cP and at most 2 500 000 cP; preferably at least 500 000 cP and at most 2 000 000 cP; more preferably at least 750 000 cP and at most 1 500 000 cP; most preferably about 1 000 000 cP.

12. The process according to claim 10 or 11, wherein the average throughput per aperture is at least 5 g/h and at most 100 g/h; preferably at least 10 g/h and at most 75 g/h; more preferably at least 20 g/h and at most 50 g/h; most preferably about 25 g/h.

13. The process according to any one of claims 10 to 12, wherein the ratio of polymer viscosity at the inlet part / average aperture diameter is at least 50 000 cp/mm to at

most 4 000 000 cp/mm; preferably at least 60 000 cp/mm to at most 2 500 000 cp/mm; preferably at least 80 000 cp/mm to at most 1 500 000 cp/mm; preferably at least 150 000 cp/mm to at most 1 200 000 cp/mm; preferably at least 200 000 cp/mm to at most 1 000 000 cp/mm; preferably at least 400 000 cp/mm to at most 600 000 cp/mm, preferably around 500 000 cp/mm.

14. The process according to any one of claims 10 to 13, wherein the ratio of average throughput per aperture / average aperture diameter is at least 2.0 g/h/mm to at most 50.0 g/h/mm; preferably at least 5.0 g/h/mm to at most 30.0 g/h/mm; preferably at least 10.0 g/h/mm to at most 15.0 g/h/mm.