CLAIMS

1. A production method of a deformed porous hollow fiber membrane by thermally induced phase separation, the production method comprising:

discharging a fusion kneaded product containing a thermoplastic resin and an organic liquid through an orifice of a hollow fiber-forming deformed nozzle, wherein the method comprises inhibiting misshaping of an asperity shape of the fusion kneaded product when exposed in an air gap after being discharged by adding an inorganic fine powder to the fusion kneaded product;

cooling and solidifying the fusion kneaded product discharged through the deformed nozzle to form the product into a hollow fiber-like material having a deformed cross section at a cross section vertical to a discharging direction; and

extracting away the organic liquid from the hollow fiber-like material to obtain the deformed porous hollow fiber membrane,

wherein the fusion kneaded product passes through the air gap after being discharged through the deformed nozzle and before being cooled and solidified, and

in the air gap, air is blown onto the fusion kneaded product at a certain angle relative to a pass through direction of the fusion kneaded product, the air being blown in a direction that is not parallel to the pass through direction.

2. The production method of a deformed porous hollow fiber membrane according to claim 1, wherein a shape of the deformed nozzle at a side for forming a periphery of the hollow fiber-like material is formed with a plurality of depressed parts and projected parts being alternately and circumferentially arranged.

3. The production method of a deformed porous hollow fiber membrane according to claim 1, wherein a continuous protrusion part is provided on the periphery of the hollow fiber-like material and of the porous hollow fiber membrane in a longitudinal direction of the membrane.

4. The production method of a deformed porous hollow fiber membrane according to claim 1, wherein a pressure at an outlet on discharge of the fusion kneaded product is not lower than 100 kPa and not higher than 900 kPa.

5. The production method of a deformed porous hollow fiber membrane according to claim 1, wherein the thermoplastic resin is composed of polyvinylidene fluoride, a polyolefin, and a blend of polyvinylidene fluoride and a polyolefin.

6. The production method of a deformed porous hollow fiber membrane according to claim 1, wherein the thermoplastic resin is hydrophobic.

7. The production method of a deformed porous hollow fiber membrane according to claim 1, wherein both of a resin temperature at the time of supplying the fusion kneaded product from an extruder toward the deformed nozzle and a resin temperature at the time of discharging the product through the orifice are higher than a torque inflection temperature of the fusion kneaded product.

8. The production method of a deformed porous hollow fiber membrane according to claim 1, wherein the inorganic fine powder in the fusion kneaded product has a mass ratio of no lower than 5% by mass and no higher than 40% by mass.

9. The production method of a deformed porous hollow fiber membrane according to claim 1, wherein the fusion kneading product has a ratio of volume that is obtained by dividing mass by specific gravity, within the range of 15% by volume to 50% by volume for the thermoplastic resin and within the range of 50% by volume to 85% by volume for the total of the organic liquid and the inorganic fine powder.

10. The production method of a deformed porous hollow fiber membrane according to claim 1, wherein the viscosity of the fusion kneaded product discharged is within the range of 1 Pa·sec to 1000 Pa·sec.

11. The production method of a deformed porous hollow fiber membrane according to claim 1, wherein the viscosity of the fusion kneaded product discharged is within the range of 2 Pa·sec to 800 Pa·sec.

12. The production method of a deformed porous hollow fiber membrane according to claim 1, wherein the viscosity of the fusion kneaded product discharged is within the range of 5 Pa·sec to 600 Pa·sec.

13. The production method of a deformed porous hollow fiber membrane according to claim 1, wherein the certain angle is from 15 to 90 degrees.

14. The production method of a deformed porous hollow fiber membrane according to claim 13, wherein the certain angle is from 45 to 90 degrees.

15. The production method of a deformed porous hollow fiber membrane according to claim 14, wherein the certain angle is from 60 to 90 degrees.