CLAIMS

1. A nonwoven fabric comprising a web of filament fibers consolidated by bonding at fusion bonds, which comprises fibers only one end of each of which has a fixed end fixed at the fusion bond with the other end free as a result of breaking part of the filament fibers, the free end having an increased thickness.

2. The nonwoven fabric according to claim 1, wherein the fibers the free end of which has an increased thickness have an increase ratio of tip diameter of 15% or more.

3. The nonwoven fabric according to claim 1 or 2, wherein the ratio of the fibers having a thickened free end to the total number of fibers only one end of each of which is fixed at the fusion bond is 20% or more.

4. The nonwoven fabric according to any one of claims 1 to 3, further comprising loop fibers projecting in loop form between the fusion bonds, the ratio of the loop fibers to the total number of the fibers only one end of each of which is fixed at the fusion bond and the loop fibers is less than 50%.

5. The nonwoven fabric according to any one of claims 1 to 4, wherein the fibers making up the nonwoven fabric have a diameter distribution index of 0.33 to 100.

6. The nonwoven fabric according to claim 1, wherein the nonwoven fabric is obtained from a spun-bonded nonwoven fabric or a complex nonwoven fabric comprising a spun-bonded layer and a melt-blown layer.

7. The nonwoven fabric according to claim 6, wherein the spun-bonded nonwoven fabric or the complex nonwoven fabric comprising a spun-bonded layer and a melt-blown layer comprises a polypropylene resin containing 5% by weight or more of an ethylene-propylene copolymer resin or 25% by weight or more of a recycled polypropylene resin.

8. The nonwoven fabric according to claim 6 or 7, wherein the spun-bonded nonwoven fabric contains a softener.

9. The nonwoven fabric according to claim 6 or 7, wherein the nonwoven fabric is obtained from a complex nonwoven fabric having a spun-bonded layer and a melt-blown layer, the spun-bonded layer comprising a plurality of spun-bonded layers,

the spun-bonded layer which contains the fibers each of which has a fixed end fixed at the fusion bond with the other end being free and having an increased thickness as a result of breaking part of the filament fibers containing a softener.

10. The nonwoven fabric according to any one of claims 1 to 9, having a compression characteristic under small load of 18.0 (gf/cm^2)/mm or less, a breaking strength of 5.00 N/5 cm or more in the CD, and a basis weight of 5 to 25 g/m^2.

11. The nonwoven fabric according to any one of claims 1 to 10, wherein raised fibers on a side of the nonwoven fabric have a smaller average diameter than surface fibers at a non-raised region on the same side.

12. The nonwoven fabric according to any one of claims 1 to 11, having 8 or more raised fibers per cm, the raised fibers having a height of 1.5 mm or less.

13. The nonwoven fabric according to any one of claims 1 to 12, wherein the breaking of part of the filament fibers is in the peripheral portion of the fusion bonds.

14. A nonwoven fabric obtained from a spun-bonded nonwoven fabric or a complex nonwoven fabric comprising a spun-bonded layer and a melt-blown layer, having a compression characteristic under small load of 18.0 (gf/cm^2)/mm or less, a breaking strength of 5.00 N/5 cm or more in the CD, and a basis weight of 5 to 25 g/m^2.

15. An absorbent article comprising the nonwoven fabric according to any one of claims 1 to 14 as a constituent member.

16. A method for making a nonwoven fabric comprising the steps of partially stretching a plurality of regions of a starting nonwoven fabric (partial stretching) at 50°C or a lower temperature and raising the fibers of the partially stretched nonwoven fabric.

17. The method according to claim 16, wherein the partial stretching is conducted to a mechanical stretch ratio of 1.05 to 20 in each of the regions.

18. The method according to claim 16 or 17, wherein the partial stretching is conducted in the transport direction and a direction perpendicular to the transport direction in each of the regions.

19. The method according to any one of claims 16 to 18, wherein the partial stretching is carried out using a pair of engraved rollers, one of the rollers having a plurality of projections on its peripheral surface, the other having recesses intermeshing with the projections arranged on its peripheral surface at positions corresponding to the individual projections, and

the starting nonwoven fabric being introduced into the nip of the pair of engraved rollers to be partially stretched.

20. The method according to claim 19, wherein the pair of engraved rollers are configured to stretch 10% to 80% of the total area of the starting nonwoven fabric introduced.

21. The method according to claim 19, wherein the transport rate V1 for introducing the nonwoven fabric into the nip of the pair of engraved rollers is higher than the peripheral velocity V2 of the pair of engraved rollers.

22. The method according to any one of claims 16 to 21, wherein the raising is carried out using an engraved roller having a plurality of projections on its peripheral surface,

the engraved roller for raising rotating in the direction reverse to the transport direction of the partially stretched nonwoven fabric, and

the transport rate V3 of the partially stretched nonwoven fabric and the

peripheral velocity V4 of the engraved roller for raising satisfying the relationship: V4/V3 = 0.3 to 10.

23. The method according to any one of claims 16 to 21, wherein the partial stretching is carried out to a total stretch ratio of 1.3 to 4.0.

24. The method according to any one of claims 16 to 23, wherein the starting nonwoven fabric has discrete heat/pressure bonds regularly spaced in planar directions, the ratio of the pitch of the heat/pressure bonds to the pitch of the projections of the pair of engraved rollers being 0.05 to 0.7.

CLAIMS

1. A nonwoven fabric comprising a web of filament fibers consolidated by bonding at fusion bonds, which comprises fibers only one end of each of which has a fixed end fixed at the fusion bond with the other end free as a result of breaking part of the filament fibers, the free end having an increased thickness.

2. The nonwoven fabric according to claim 1, wherein the fibers the free end of which has an increased thickness have an increase ratio of tip diameter of 15% or more.

3. The nonwoven fabric according to claim 1 or 2, wherein the ratio of the fibers having a thickened free end to the total number of fibers only one end of each of which is 10 fixed at the fusion bond is 20% or more.

4. The nonwoven fabric according to any one of claims 1 to 3, further comprising loop fibers projecting in loop form between the fusion bonds, the ratio of the loop fibers to the total number of the fibers only one end of each of which is fixed at the fusion bond and the loop fibers is less than 50%.

5. The nonwoven fabric according to any one of claims 1 to 4, wherein the fibers making up the nonwoven fabric have a diameter distribution index of 0.33 to 100.

6. The nonwoven fabric according to claim 1, wherein the nonwoven fabric is obtained from a spun-bonded nonwoven fabric or a complex nonwoven fabric comprising a spun-bonded layer and a melt-blown layer.

7. The nonwoven fabric according to claim 6, wherein the spun-bonded nonwoven fabric or the complex nonwoven fabric comprising a spun-bonded layer and a melt-blown layer comprises a polypropylene resin containing 5% by weight or more of an ethylene-propylene copolymer resin or 25% by weight or more of a recycled polypropylene resin.

8. The nonwoven fabric according to claim 6 or 7, wherein the spun-bonded nonwoven fabric contains a softener.

9. The nonwoven fabric according to claim 6 or 7, wherein the nonwoven fabric is obtained from a complex nonwoven fabric having a spun-bonded layer and a melt-blown layer, the spun-bonded layer comprising a plurality of spun-bonded layers,

the spun-bonded layer which contains the fibers each of which has a fixed end fixed at the fusion bond with the other end being free and having an increased thickness as a result of breaking part of the filament fibers containing a softener.

10. The nonwoven fabric according to any one of claims 1 to 9, having a compression characteristic under small load of 18.0 $(gf/cm^2)/mm$ or less, a breaking strength of 5.00 N/5 cm or more in the CD, and a basis weight of 5 to 25 g/m^2.

11. The nonwoven fabric according to any one of claims 1 to 10, wherein raised fibers on a side of the nonwoven fabric have a smaller average diameter than surface fibers at a non-raised region on the same side.

12. The nonwoven fabric according to any one of claims 1 to 11, having 8 or more raised fibers per cm, the raised fibers having a height of 1.5 mm or less.

13. The nonwoven fabric according to any one of claims 1 to 12, wherein the breaking of part of the filament fibers is in the peripheral portion of the fusion bonds.

14. A nonwoven fabric obtained from a spun-bonded nonwoven fabric or a complex nonwoven fabric comprising a spun-bonded layer and a melt-blown layer, having a compression characteristic under small load of 18.0 $(gf/cm^2)/mm$ or less, a breaking strength of 5.00 N/5 cm or more in the CD, and a basis weight of 5 to 25 g/m^2.

15. An absorbent article comprising the nonwoven fabric according to any one of claims 1 to 14 as a constituent member.

16. A method for making a nonwoven fabric comprising the steps of partially stretching a plurality of regions of a starting nonwoven fabric (partial stretching) at 50°C or a lower temperature and raising the fibers of the partially stretched nonwoven fabric.

17. The method according to claim 16, wherein the partial stretching is conducted to a mechanical stretch ratio of 1.05 to 20 in each of the regions.

18. The method according to claim 16 or 17, wherein the partial stretching is conducted in the transport direction and a direction perpendicular to the transport direction in each of the regions.

19. The method according to any one of claims 16 to 18, wherein the partial stretching is carried out using a pair of engraved rollers, one of the rollers having a plurality of projections on its peripheral surface, the other having recesses intermeshing with the projections arranged on its peripheral surface at positions corresponding to the individual projections, and

the starting nonwoven fabric being introduced into the nip of the pair of engraved rollers to be partially stretched.

20. The method according to claim 19, wherein the pair of engraved rollers are configured to stretch 10% to 80% of the total area of the starting nonwoven fabric introduced.

21. The method according to claim 19, wherein the transport rate V1 for introducing the nonwoven fabric into the nip of the pair of engraved rollers is higher than the peripheral velocity V2 of the pair of engraved rollers.

22. The method according to any one of claims 16 to 21, wherein the raising is carried out using an engraved roller having a plurality of projections on its peripheral surface,

the engraved roller for raising rotating in the direction reverse to the transport direction of the partially stretched nonwoven fabric, and

the transport rate V3 of the partially stretched nonwoven fabric and the peripheral velocity V4 of the engraved roller for raising satisfying the relationship: V4/V3 = 0.3 to 10.

23. The method according to any one of claims 16 to 21, wherein the partial stretching is carried out to a total stretch ratio of 1.3 to 4.0.

24. The method according to any one of claims 16 to 23, wherein the starting nonwoven fabric has discrete heat/pressure bonds regularly spaced in planar directions, the ratio of the pitch of the heat/pressure bonds to the pitch of the projections of the pair of engraved rollers being 0.05 to 0.7.

25. The method according to claim 16, wherein the nonwoven fabric is obtained from a spun-bonded nonwoven fabric or a complex nonwoven fabric comprising a spun-bonded layer and a melt-blown layer.