WHAT IS CLAIMED IS:

1. A spindle unit comprising:

a spindle having a tip part to which a mount for mounting a processing tool is connected;

a casing that surrounds at least a part other than the tip part of the spindle and is formed with an air jet port for jetting air toward the spindle in order to form an air bearing; and

a cover mounted to the casing in such a manner as to surround the tip part of the spindle with a gap therebetween,

wherein a region of a side surface of the tip part of the spindle, the region being opposed to an inside surface of the cover with the gap therebetween, is formed with a plurality of grooves in such a manner as to go round the spindle one time along a circumferential direction of the spindle, and the gap between the tip part of the spindle and the cover includes passages smaller in sectional area and expansion chambers larger in sectional area alternately disposed from a mount side.

2. The spindle unit according to claim 1, wherein the plurality of grooves includes a first groove and a second groove.

3. The spindle unit according to claim 2, wherein a sectional shape of the first groove is a trapezoid whose width becomes narrower as going nearer to a bottom surface of the first groove.

4. The spindle unit according to claim 3, wherein a side surface on the mount side of the first groove is inclined relative to the circumferential direction of the spindle.

5. The spindle unit according to claim 2, wherein a sectional shape of the second groove is a rectangle having a substantially constant width.

6. The spindle unit according to any one of claims 1 to 5, wherein an inside surface of the cover is also formed with a third groove, the third groove going round the inside surface of the cover one time and being opposed to a region of the side surface of the tip part of the spindle, the region being located above the second groove.

7. The spindle unit according to claim 6, wherein a sectional shape of the third groove formed in the inside surface of the cover is a right-angled triangle.