CLAIMS

1. A turbo molecular pump comprising a stationary frame structure and at least one rotor stage located at a low pressure input region, wherein the at least one rotor stage is substantially accommodated within or substantially resides inside the stationary frame structure, wherein the rotor in the at least one rotor stage rotates about an axis with respect to the stationary frame structure during operation and has an axially aligned central shaft receiving member from which a first rotor blade portion extends substantially radially outward and is connected to a second rotor blade portion which extends substantially paraxially to, and along the central shaft receiving member towards a high pressure output region, wherein, during operation, the first and second rotor blade portions deflect gaseous matter substantially paraxially and radially inwards, wherein the central shaft receiving member, the first rotor blade portion and the second rotor blade portion are designed and configured such that there is a substantially free path between the second rotor blade portion and the central shaft receiving member for gaseous matter deflected substantially radially inwards.

2. The turbo molecular pump of claim 1, wherein the rotor blades in the first rotor blade portion are inclined in relation to a first plane perpendicular to the central shaft receiving member, and wherein the rotor blades in the second rotor blade portion are inclined in relation to a substantially hollow-cylindrical envelope contour ~~generated~~ defined by the second rotor blade portion.

~~3. The turbo molecular pump of claim 1 or claim 2, further comprising a third rotor blade portion which extends substantially radially outward from the central shaft receiving member and connects to the second rotor blade portion at a position between the low pressure input region and high pressure output region, in order to enhance mechanical stability, wherein, during operation, the third rotor blade portion deflects gaseous matter substantially paraxially.~~

~~4. The turbo molecular pump of claim 3, wherein the rotor blades in the third rotor blade portion are inclined in relation to a second plane perpendicular to the central shaft receiving member.~~

~~5. The turbo molecular pump of any one of the claims 1 to 4, wherein a number of rotor blades in at least one of the first rotor blade portion, second rotor blade portion and third rotor blade portion is odd in order to reduce resonant vibrations.~~

~~6~~3. The turbo molecular pump of ~~any one of the~~ claim~~s~~ 1~~ to 5~~, wherein adjacent rotor blades in at least one of the first rotor blade portion and~~,~~ second rotor blade portion ~~and third rotor blade portion~~ substantially overlap each other such that there is no direct line of sight from inside to outside so as to prevent gaseous matter having entered the inside from escaping or otherwise leaving, except in a direction towards the high pressure output region.

~~7~~4. The turbo molecular pump of ~~any one of the~~ claim~~s~~ 1~~ to 6~~, further comprising a ring-like support structure that connects the distal ends of the rotor blades in the second rotor blade portion in order to enhance mechanical stability.

~~8~~5. The turbo molecular pump of ~~any one of the~~ claim~~s~~ 1~~ to 7~~, wherein the rotor blades in the second rotor blade portion comprise rounded edges at a point of connection to the rotor blades in the first rotor blade portion.

~~9~~6. The turbo molecular pump of ~~any one of the~~ claim~~s~~ 1~~ to 8~~, wherein the first rotor blade portion transitions into the second rotor blade portion.

~~10~~7. The turbo molecular pump of ~~any one of the~~ claim~~s~~ 1~~ to 9~~, wherein a paraxial extension of the second rotor blade portion is equal to or greater than a radial extension of the first rotor blade portion.

~~11~~8. The turbo molecular pump of ~~any one of the~~ claim~~s~~ 1 ~~to 10~~, wherein the central shaft receiving member comprises a hollow receptacle for accommodating a drive shaft which enables setting the central shaft receiving member in rotation.

~~12~~9. The turbo molecular pump of ~~any one of the~~ claim~~s~~ 1 ~~to 11~~, wherein the central shaft receiving member flares from the high pressure output region to the low pressure input region, at least section-wise, in order to impart the gaseous matter deflected substantially radially inwards from the second rotor blade portion an additional momentum in a direction toward the high pressure output region.

~~13~~10. The turbo molecular pump of ~~any one of the~~ claim~~s~~ 1 ~~to 12~~, wherein the rotor blades in the second rotor blade portion are helically distorted along a substantially hollow-cylindrical envelope contour ~~generated~~ defined by the second rotor blade portion in order to deflect the gaseous matter from the second rotor blade portion both substantially paraxially and radially inwards.

~~14~~11. The turbo molecular pump of ~~any one of the~~ claim~~s~~ 1 ~~to 13~~, wherein the rotor in the at least one rotor stage is produced from stable metals ~~such as aluminum, magnesium, titanium~~ or alloys thereof.

12. The turbo molecular pump of claim 11, wherein the rotor in the at least one rotor stage is produced from aluminum, magnesium, titanium or alloys thereof.

13. The turbo molecular pump of claim 1, further comprising, in a multi-port configuration, a second rotor stage at a position spaced apart from the low pressure input region, which second rotor stage is of similar configuration as the at least one rotor stage located at the low pressure input region.

14. The turbo molecular pump of claim 1, wherein a number of rotor blades in at least one of the first rotor blade portion and second rotor blade portion is odd in order to reduce resonant vibrations.

15. A turbo molecular pump comprising a stationary frame structure and at least one rotor stage located at a low pressure input region, wherein the rotor in the at least one rotor stage rotates about an axis with respect to the stationary frame structure during operation and has an axially aligned central shaft receiving member from which a first rotor blade portion extends substantially radially outward and is connected to a second rotor blade portion which extends substantially paraxially to, and along the central shaft receiving member towards a high pressure output region, wherein, during operation, the first and second rotor blade portions deflect gaseous matter substantially paraxially and radially inwards, further comprising a third rotor blade portion which extends substantially radially outward from the central shaft receiving member and connects to the second rotor blade portion at a position between the low pressure input region and high pressure output region axially offset from the first rotor blade portion, in order to enhance mechanical stability, wherein, during operation, the third rotor blade portion deflects gaseous matter substantially paraxially.

16. The turbo molecular pump of claim 15, wherein the rotor blades in the third rotor blade portion are inclined in relation to a second plane perpendicular to the central shaft receiving member.

17. The turbo molecular pump of claim 15, wherein a number of rotor blades in at least one of the first rotor blade portion, second rotor blade portion and third rotor blade portion is odd in order to reduce resonant vibrations.

18. The turbo molecular pump of claim 15, wherein adjacent rotor blades in at least one of the first rotor blade portion, second rotor blade portion and third rotor blade portion substantially overlap each other such that there is no direct line of sight from inside to outside so as to prevent gaseous matter having entered the inside from escaping or otherwise leaving, except in a direction towards the high pressure output region.

~~15~~19. A mass spectrometer, comprising:

- a recipient which has at least one compartment that, during operation, is to be maintained at a pressure substantially lower than ambient atmospheric pressure, and

- a turbo molecular pump ~~in accordance with any one of the claims 1 to 14, which is mounted at the at least one compartment such that the second rotor blade portion substantially protrudes into the at least one compartment~~ comprising a stationary frame structure and at least one rotor stage located at a low pressure input region, wherein the at least one rotor stage is substantially accommodated within or substantially resides inside the stationary frame structure, wherein the rotor in the at least one rotor stage rotates about an axis with respect to the stationary frame structure during operation and has an axially aligned central shaft receiving member from which a first rotor blade portion extends substantially radially outward and is connected to a second rotor blade portion which extends substantially paraxially to, and along the central shaft receiving member towards a high pressure output region, wherein, during operation, the first and second rotor blade portions deflect gaseous matter substantially paraxially and radially inwards, wherein the central shaft receiving member, the first rotor blade portion and the second rotor blade portion are designed and configured such that there is a substantially free path between the second rotor blade portion and the central shaft receiving member for gaseous matter deflected substantially radially inwards, and wherein the turbo molecular pump is mounted at the at least one compartment such that the second rotor blade portion substantially protrudes into the at least one compartment.

~~16~~20. The mass spectrometer of claim ~~15~~19, wherein the at least one compartment contains at least one mass analyzer or at least one source of gas, and the second rotor blade portion protrudes such as to be directly exposed to gaseous matter escaping or otherwise leaving the at least one mass analyzer and emanating from the at least one source of gas, respectively.

~~17~~21. The mass spectrometer of claim ~~15 or claim 16~~19, wherein the at least one compartment contains at least one of a time-of-flight drift tube, Kingdon-type mass analyzer, 2D or 3D ion trap, mass filter and an ion cyclotron resonance cell.

~~18. The turbo molecular pump of any one of the claims 1 to 14, further comprising, in a multi-port configuration, a second rotor stage at a position spaced apart from the low pressure input region, which second rotor stage is of similar configuration as the at least one rotor stage located at the low pressure input region.~~

~~19~~22. A mass spectrometer, comprising:

- a recipient which has at least two adjacent compartments that, during operation, are to be maintained at pressures substantially lower than ambient atmospheric pressure, and

- a turbo molecular pump of multi-port configuration ~~in accordance with claim 18, which is mounted at the at least two adjacent compartments such that the second rotor blade portion substantially protrudes into a first one of the at least two adjacent compartments and the second rotor stage is fluidically connected to a second one of the at least two adjacent compartments~~ comprising a stationary frame structure and at least a first rotor stage located at a low pressure input region, wherein the at least one rotor stage is substantially accommodated within or substantially resides inside the stationary frame structure, wherein the rotor in the first rotor stage rotates about an axis with respect to the stationary frame structure during operation and has an axially aligned central shaft receiving member from which a first rotor blade portion extends substantially radially outward and is connected to a second rotor blade portion which extends substantially paraxially to, and along the central shaft receiving member towards a high pressure output region, wherein, during operation, the first and second rotor blade portions deflect gaseous matter substantially paraxially and radially inwards, wherein the central shaft receiving member, the first rotor blade portion and the second rotor blade portion are designed and configured such that there is a substantially free path between the second rotor blade portion and the central shaft receiving member for gaseous matter deflected substantially radially inwards, and

comprising a second rotor stage at a position spaced apart from the low pressure input region, which second rotor stage is of similar configuration as the first rotor stage located at the low pressure input region,

wherein the turbo molecular pump of multi-port configuration is mounted at the at least two adjacent compartments such that the second rotor blade portion substantially protrudes into a first one of the at least two adjacent compartments and the second rotor stage is fluidically connected to a second one of the at least two adjacent compartments.