

CLAIMS

1. A vacuum pump comprising:
an inlet flange for connecting to a vacuum chamber, said inlet flange
5 comprising a plurality of apertures for receiving a plurality of protruding fixing
elements extending from said vacuum chamber, said protruding fixing elements
comprising an enlarged retaining portion at an end remote from said vacuum
chamber and a fastener receiving portion having at least one radial dimension
that is smaller than a corresponding dimension of said enlarged retaining portion;
10 a fastening mechanism comprising a plurality of slots each extending from
a same side of a plurality of apertures; wherein
said fastening mechanism is configured to be rotatable between a
mounting position in which said apertures are aligned with said protruding fixing
elements and a sealing position in which said slots are aligned with said
15 protruding fixing elements.
2. A vacuum pump according to claim 1, wherein at least a portion of a
surface of said fastening mechanism surrounding each of said slots is sloped,
such that said at least a portion of said fastening mechanism is thinner closer to
20 said aperture and thicker closer to an other end of said slot.
3. A vacuum pump according to claim 2, wherein a surface of said retaining
portion of said protruding fixing elements extending radially beyond said fastener
receiving portion is sloped, an angle of said slope corresponding to an angle of
25 said sloped surface surrounding said slots.
4. A vacuum pump according to any preceding claim, said plurality of
apertures being sized such that at least one dimension of said apertures is larger
than a width of said slots.
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5. A vacuum pump according to any preceding claim, wherein said fastening
mechanism comprises said inlet flange, said inlet flange comprising said plurality

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of slots each extending from said plurality of apertures, said pump being rotatable between said mounting position and said sealing position when mounting said pump to a vacuum system.

- 5 6. A vacuum pump according to any one of claims 1 to 4, wherein said fastening mechanism comprises a fastener mounted around an outer surface of said vacuum pump adjacent to said inlet flange, said fastener comprising:
- a plurality of apertures and said plurality of slots,
said plurality of slots each extending from a same side of said
- 10 plurality of apertures; wherein
- said fastener is mounted to be rotatable about said outer surface of said pump between a mounting position in which said plurality of apertures on said fastener are aligned with said plurality of flange apertures on said flange and a sealing position in which a portion of said plurality of slots are aligned with said
- 15 plurality of apertures on said flange.
7. A vacuum pump according to claim 6, wherein said fastener comprises a ring and said slots extend in a circumferential direction parallel to a circumference of said ring, so that protruding fixing elements passing through said apertures
- 20 move from said plurality of apertures along said plurality of slots on rotation of said fastener from said mounting position to said sealing position.
- 8, A vacuum pump according to any preceding claim, wherein said fastening mechanism comprises a plurality of retainers corresponding to said plurality of
- 25 protruding fixing elements, said plurality of retainers being formed of a material that is softer than a material forming a portion of said fastening mechanism comprising said slots and being configured to be mounted between said enlarged portion of said protruding fixing elements and said portion of said fastening mechanism comprising said slots.
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9. A vacuum pump according to claim 8, wherein said plurality of retainers each comprise a side wall partially surrounding an aperture, said side wall

comprising an opening configured such that said corresponding protruding fixing element can be pushed through said opening on mounting of said retaining element to said protruding fixing element, at least one dimension of said aperture being smaller than a corresponding dimension of said enlarged retaining portion
5 of said protruding fixing element.

10. A vacuum pump according to any one of claims 1 to 7, wherein said fastening mechanism comprises a retaining element comprising a plurality of apertures for receiving said plurality of protruding fixing elements, each of said
10 plurality of apertures in said retaining element comprise a receiving portion and a reduced sized retaining portion, said retaining element being rotatable between a mounting position where said receiving portions of said apertures are aligned with said protruding fixing elements and a retaining position where said retaining
15 portions of said apertures are aligned with said protruding fixing elements, at least one dimension of said retaining portion being smaller than a corresponding dimension of said enlarged retaining portion of said protruding fixing element.

11. A vacuum pump according to any preceding claim, wherein said fastening mechanism comprises a biasing element comprising a plurality of apertures for
20 receiving said plurality of protruding fixing elements, at least a portion of at least one surface of said biasing element being sloped, such that portions of said biasing element are thicker around said apertures and are thinner away from said apertures.

25 12. A vacuum pump according to claim 10 and 11, wherein said retaining element and said biasing element are a same element.

13. A vacuum pump according to any one of claims 11 or 12, when dependent on any one of claims 6 or 7, wherein said fastener is configured to be mounted
30 between said biasing element and said flange of said pump.

14. A vacuum pump according to any one of claims 11 to 13 when dependent upon claim 2, wherein said sloped surface of said biasing element is configured to face said surface of said fastening mechanism comprising said sloped portions surrounding each of said slots.

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15. A vacuum pump according to claims 13 and 14, wherein said fastener and said biasing element are configured such that when said apertures are aligned a combined thickness of said fastener and said biasing element is reduced and on rotation of at least one of said fastener and biasing element to a retaining position
10 said combined thickness is increased.

16. A vacuum pump according to claim 14 or 15, wherein said sloped surface of said biasing element and said surface of said fastening mechanism which it faces are coated with a low friction coating.

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17. A vacuum pump according to any one of claims 10 to 14, further comprising an intermediate element comprising axial protrusions extending from at least one surface, said fastening mechanism being configured such that on rotation of said intermediate element relative to other elements of said fastening
20 mechanism said axial protrusions travel along one of said sloped surfaces of said fastening mechanism, such that a width of said fastening mechanism changes on said relative rotation.

18. A vacuum pump according to claim 17, said intermediate element
25 comprising said slots and being configured to rotate between a mounting position where a combined thickness of said fastening mechanism is reduced to a retaining position where said combined thickness is increased.

19. A vacuum pump according to claim 17 or 18, wherein said axial protrusion
30 comprises rolling elements.

20. A vacuum pump according to any one of claims 6 to 19, wherein at least one of said fastener, biasing, intermediate and retaining elements comprises a plurality of articulated sections.

5 21. A vacuum pump according to claim 20, wherein each articulated section comprises at least one aperture and at least one slot.

22. A vacuum pump according to claim 20 or 21, wherein each articulated section is curved.

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23. A vacuum pump according to any preceding claim, wherein said vacuum pump comprises a turbomolecular pump.

15 24. A vacuum system comprising a vacuum chamber comprising an outlet comprising a plurality of protruding fixing elements extending around said outlet towards an exterior of said chamber and a vacuum pump according to any preceding claim, said vacuum pump being mounted to said vacuum chamber by said plurality of protruding fixing elements extending through said apertures on said inlet flange of said vacuum pump and said slots of said fastening
20 mechanism.

25. A method of mounting a flanged vacuum pump according to any preceding claim, to a vacuum chamber comprising a plurality of protruding fixing elements extending around an outlet, said method comprising:

25 aligning apertures in the fastening mechanism with the protruding fixing elements;

sliding the aligned apertures over the protruding fixing elements; and

rotating a portion of the fastening mechanism comprising the slots so that the protruding fixing elements slide within the slots in the fastening mechanism.

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26. A kit for mounting a flanged pump to a vacuum chamber, said kit comprising:

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a plurality of bolts configured for mounting in a plurality of bolt receiving holes located around a fluid opening in said vacuum chamber, said bolts comprising an attaching end portion for mounting in and attaching to said bolt receiving holes, a fastener receiving portion and an enlarged retaining portion remote from said attaching end portion, said fastener receiving portion having at least one dimension that is smaller than a corresponding dimension of said retaining portion; and

a fastening mechanism for mounting to said flanged pump, said fastening mechanism comprising:

- 10 a plurality of apertures said plurality of apertures being sized such that said retaining portion can pass through said apertures; and
- a plurality of slots each extending from a same side of said plurality of apertures; wherein
- said fastening mechanism is configured to be mounted to said flanged
- 15 pump by wrapping said fastening mechanism around an outer surface of said flanged pump adjacent to said flange such that said fastening mechanism is rotatable about said outer surface between a mounting position in which said plurality of apertures are aligned with said plurality of bolt receiving holes and a sealing position in which a portion of said plurality of slots are aligned with said
- 20 plurality of bolt receiving holes.

27. A kit according to claim 26, wherein at least a portion of a surface of said fastening mechanism surrounding each of said slots is sloped, such that said at least a portion of said fastening mechanism is thinner closer to said aperture and
- 25 thicker closer to an other end of said slot, movement of said bolts along said slots from said aperture at said mounting position to said sealing position pushing said pump towards said vacuum chamber.