Claims

1. A device for storing kinetic energy, comprising:
a flywheel arranged in an interior of a housing,
a shaft connected to the flywheel and supported in the housing,
a motor-generator unit for driving the flywheel and for recovering energy, and
a vacuum pump provided in the housing for evacuating the interior, wherein the vacuum pump is arranged on the shaft, and wherein the vacuum pump comprises a turbomolecular pump stage with a gas friction compressor, the gas friction compressor being arranged downstream of the turbomolecular pump stage in a flow direction.

2. The device of claim 1, wherein the vacuum pump is arranged on the shaft as a separate component.

3. The device of claim 1, wherein the turbomolecular pump stage is a pump with a large pressure range, wherein a compression from 20 mbar to less than 10^{-5} mbar is performed.

4. The device of claim 1, wherein the vacuum pump is arranged at least partly inside an outer casing.

5. The device of claim 4, wherein the outer casing comprises fiber-reinforced plastic material.

6. The device of claim 4, wherein the outer casing is connected to the flywheel or the housing.

7. The device of claim 4, wherein the outer casing supports rotor discs of the vacuum pump.

8. The device of claim 4, wherein the outer casing supports stator discs of the vacuum pump.

9. The device of claim 1, wherein the vacuum pump is arranged at least partly outside an inner casing.

10. The device of claim 9, wherein the inner casing is connected to the housing or the shaft.

11. The device of claim 9, wherein the inner casing comprises fiber-reinforced plastic material.

12. The device of claim 9, wherein the inner casing supports rotor discs of the vacuum pump.

13. The device of claim 9, wherein the inner casing supports stator discs.

14. The device of claim 9, wherein the vacuum pump is arranged at least partly between an outer casing and the inner casing.

15. The device of claim 1, wherein the gas friction compressor is a Holweck stage and the turbomolecular pump stage at least partly surrounds the Holweck stage.

16. The device of claim 1, wherein the flywheel at least partly surrounds the vacuum pump.

17. A device for storing kinetic energy, comprising:
a flywheel arranged in an interior of a housing,
a shaft connected to the flywheel and supported in the housing,
a motor-generator unit for driving the flywheel and for recovering energy,
a vacuum pump provided in the housing for evacuating the interior, wherein the vacuum pump is arranged on the shaft, and wherein the vacuum pump

comprises a turbomolecular pump stage with a gas friction compressor, the gas friction compressor being arranged downstream of the turbomolecular pump stage in a flow direction, and a backing pump connected to a housing outlet.

18. The device of claim 17, further comprising a buffer chamber provided between the housing outlet and the backing pump.