The ADI preferably has at least 90% graphite nodularity.

The ADI preferably has a matrix of acicular ferrite and carbon stabilised austenite.

The austempered ductile iron preferably comprises one or more of the following: carbon in amount within the range from 3.4 to 3.5 % by mass, silicon in amount within the range from 2 to 2.3 % by mass, manganese in amount within the range from 0.075 to 0.15 % by mass, molybdenum in amount within the range from 3.4 to 3.5 % by mass, nickel in amount within the range from 1.2 to 1.4 % by mass, and copper in amount within the range from 0.75 to 0.95 % by mass.

Preferred features of the present invention will now be described, by way of example only, with reference to the following drawings, in which:

Figure 1 is a cross-section through a multi-stage dry vacuum pump; and

Figure 2 is a view along line A-A in Figure 1.

With reference to Figures 1 and 2, a multi-stage dry vacuum pump 10 comprises a stator component 12, preferably formed from austempered ductile iron (ADI), having a series of walls that define a plurality of pumping chambers 14, 16, 18, 20, 22. An inlet conduit 24 for conveying gas to be pumped to the inlet pumping chamber 14, and an exhaust conduit 26 for exhausting pumped gas from the exhaust pumping chamber 22, are also formed in the stator 12. Circumferential passages 28, 30, 32 and 34 formed in the stator 12 connect the pumping chambers 14, 16, 18, 20, 22 in series.

The stator 12 houses a first shaft 36 and, spaced therefrom and parallel thereto, a second shaft 38. Bearings 40 for supporting the shafts 36, 38 are provided in the end plates 42, 44 of the stator 12. One of the shafts 36 is connected to a drive motor 46, the shafts being coupled together by means of timing gears 47 so that in use the shafts 36,38 rotate at the same speed but in opposite directions, as

CLAIMS

1. A dry vacuum pump comprising a stator component and at least one rotor component, wherein the stator component and/or said at least one rotor component are formed from austempered ductile iron.

2. A pump according to Claim 1, wherein said at least one rotor component has one of a screw, Roots or Northey profile.

3. A pump according to Claim 2, comprising first and second intermeshing rotor components adapted for counter-rotation within the stator component.

4. A pump according to Claim 3, in the form of a multi-stage dry vacuum pump in which the stator component defines a plurality of interconnected pumping chambers arranged in series and each housing a respective pair of rotor components each formed from austempered ductile iron.

5. A pump according to Claim 3 or Claim 4, wherein intermeshing rotor components are located on respective shafts, the pump comprising a gear assembly for transmitting torque from one shaft to another, at least one gear of the gear assembly being formed from austempered ductile iron.

6. A pump according to Claim 1, in the form of a scroll pump in which the stator component comprises a fixed scroll member having an end plate with a first spiral wrap extending therefrom, and said at least one rotor component comprises an orbital scroll member having an end plate with a second spiral wrap extending therefrom to intermesh with the first spiral wrap.

7. A pump according to any preceding claim, wherein the austempered ductile iron has at least 90% graphite nodularity.

8. A pump according to any preceding claim, wherein the austempered ductile iron has a matrix of acicular ferrite and carbon stabilised austenite.

9. A pump according to any preceding claim, wherein the austempered ductile iron comprises carbon in amount within the range from 3.4 to 3.5 % by mass.

10. A pump according to any preceding claim, wherein the austempered ductile iron comprises silicon in amount within the range from 2 to 2.3 % by mass.

11. A pump according to any preceding claim, wherein the austempered ductile iron comprises manganese in amount within the range from 0.075 to 0.15 % by mass.

12. A pump according to any preceding claim, wherein the austempered ductile iron comprises molybdenum in amount within the range from 3.4 to 3.5 % by mass.

13. A pump according to any preceding claim, wherein the austempered ductile iron comprises nickel in amount within the range from 1.2 to 1.4 % by mass.

14. A vacuum pump rotor or stator component formed from austempered ductile iron.

The ADI preferably has at least 90% graphite nodularity.

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The austempered ductile iron preferably comprises one or more of the following: carbon in amount within the range from 3.4 to 3.5 % by mass, silicon in amount within the range from 2 to 2.3 % by mass, manganese in amount within the range from 0.2 to 0.22 % by mass, molybdenum in amount within the range from 0.075 to 0.15% by mass, nickel in amount within the range from 1.2 to 1.4 % by mass, and copper in amount within the range from 0.75 to 0.95 % by mass.

Preferred features of the present invention will now be described, by way of example only, with reference to the following drawings, in which:

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With reference to Figures 1 and 2, a multi-stage dry vacuum pump 10 comprises a stator component 12, preferably formed from austempered ductile iron (ADI), having a series of walls that define a plurality of pumping chambers 14, 16, 18, 20, 22. An inlet conduit 24 for conveying gas to be pumped to the inlet pumping chamber 14, and an exhaust conduit 26 for exhausting pumped gas from the exhaust pumping chamber 22, are also formed in the stator 12. Circumferential passages 28, 30, 32 and 34 formed in the stator 12 connect the pumping chambers 14, 16, 18, 20, 22 in series.

The stator 12 houses a first shaft 36 and, spaced therefrom and parallel thereto, a second shaft 38. Bearings 40 for supporting the shafts 36, 38 are provided in the end plates 42, 44 of the stator 12. One of the shafts 36 is connected to a drive motor 46, the shafts being coupled together by means of timing gears 47 so that in use the shafts 36,38 rotate at the same speed but in opposite directions, as

CLAIMS

1. A dry vacuum pump for pumping chlorine, boron trichloride, hydrogen bromide, fluorine and chlorine trifluoride comprising a stator component and at least one rotor component, wherein that stator component and/or at least one rotor component are formed from austempered ductile iron.

2. A pump according to Claim 1, wherein said at least one rotor component has one of a screw, Roots or Northey profile.

3. A pump according to Claim 2, comprising first and second intermeshing rotor components adapted for counter-rotation within the stator component.

4. A pump according to Claim 3, in the form of a multi-stage dry vacuum pump in which the stator component defines a plurality of interconnected pumping chambers arranged in series and each housing a respective pair of rotor components each formed from austempered ductile iron.

5. A pump according to Claim 3 or Claim 4, wherein intermeshing rotor components are located on respective shafts, the pump comprising a gear assembly for transmitting torque from one shaft to another, at least one gear of the gear assembly being formed from austempered ductile iron.

6. A pump according to Claim 1, in the form of a scroll pump in which the stator component comprises a fixed scroll member having an end plate with a first spiral wrap extending therefrom, and said at least one rotor component comprises an orbital scroll member having an end plate with a second spiral wrap extending therefrom to intermesh with the first spiral wrap.

7. A pump according to any preceding claim, wherein the austempered ductile iron has at least 90% graphite nodularity.

8. A pump according to any preceding claim, wherein the austempered ductile iron has a matrix of acicular ferrite and carbon stabilised austenite.

9. A pump according to any preceding claim, wherein the austempered ductile iron comprises carbon in amount within the range from 3.4 to 3.5 % by mass.

10. A pump according to any preceding claim, wherein the austempered ductile iron comprises silicon in amount within the range from 2 to 2.3 % by mass.

11. A pump according to any preceding claim, wherein the austempered ductile iron comprises manganese in amount within the range from 0.2 to 0.22 % by mass.

12. A pump according to any preceding claim, wherein the austempered ductile iron comprises molybdenum in amount within the range from 0.075 to 0.15% by mass.

13. A pump according to any preceding claim, wherein the austempered ductile iron comprises nickel in amount within the range from 1.2 to 1.4 % by mass.

14. A vacuum pump rotor or stator component formed from austempered ductile iron.