SUMMARY

[0006] According to a first aspect of the present invention, there is provided revolving vane compressor, comprising:

a rotor having a first rotational axis;

a sleeve configured to surround the rotor along a direction parallel to the first rotational axis, the sleeve having a second rotational axis parallel to and offset from the first rotational axis such that a channel is formed between the sleeve and the rotor, the sleeve further having open first and second ends;

a primary vane having one end in swivel engagement with the sleeve and the other end in sliding engagement with the rotor such that the rotor is operable to drive the sleeve, and vice versa;

at least one secondary vane, the primary vane and the at least one secondary vane partitioning the channel into a plurality of chambers;

a stationary flow regulator configured to abut the open first end of the sleeve;

a first housing member configured to receive the flow regulator, wherein the first housing member forms a unitary construction with the flow regulator;

wherein the flow regulator is shaped such that, in a first rotational position of the sleeve relative to the flow regulator, one of the plurality of chambers is in fluid communication with a compressor inlet for drawing a compressible fluid into said chamber, and in a second rotational position of the sleeve relative to the flow regulator, the flow regulator seals said chamber for compressing the fluid within said chamber.

[0007]

[0008]

[0009] The revolving vane compressor may further comprise a second housing member positioned to surround the sleeve, and the second housing member may comprise an end face configured to abut the open second end of the sleeve, the end face having at least one discharge hole.

[0010] The one of the plurality of chambers is in fluid communication with the at least one discharge hole in a third rotational position of the sleeve relative to the flow regulator, for discharging the fluid.

[0011] The revolving vane compressor may further comprise at least one valve configured to control the respective discharge holes.

[0012] At least one of a position and a size of the at least one discharge hole may be configured to provide a constant discharge rate.

[0013] The revolving vane compressor may further comprise a third housing member positioned downstream of the second housing member, the third housing member further comprising a discharge outlet in fluid communication with the at least one discharge hole to discharge the compressible fluid.

[0014] According to a second aspect of the present invention, there is provided a method of operating a revolving vane compressor, the method comprising:

partitioning a fluid channel formed between a rotor and a sleeve into a plurality of chambers;

rotating the rotor about a first rotational axis to drive the sleeve to a first rotational position relative to a stationary flow regulator, wherein a chamber fluidly communicates with a compressor inlet;

drawing a predetermined quantity of compressible fluid into the chamber by further rotating the rotor from the first rotational position to a second rotational position, wherein the flow regulator forms a unitary construction with a first housing member of the compressor, and wherein the flow regulator seals said chamber from the compressor inlet for compressing the compressible fluid within said chamber;

compressing the compressible fluid within said chamber by further rotating the rotor from the second rotational position to a third rotational position; and

discharging the compressible fluid from said chamber through at least one discharge hole at the third rotational position.

[0015] Partitioning the fluid channel into a plurality of chambers may comprise using a primary vane and at least one secondary vane.

[0016] The method may further comprise repeating the drawing, compressing and discharging steps for each additional chamber of the plurality of chambers, the compressor thereby producing a plurality of discharges per each complete revolution.

[0017] Discharging the compressible fluid may comprise controlling at least one discharge hole using respective valves.

[0018] According to a third aspect of the present invention, there is provided a method of manufacturing a revolving vane compressor, the method comprising the steps of:

providing a first housing member;

assembling a flow regulator to the first housing member such that the flow regulator is rotationally fixed relative to the first housing member and forms a unitary construction with the first housing member;

assembling a sleeve assembly to the flow regulator, the sleeve assembly comprising a sleeve having open first and second ends, such that the open first end of the sleeve abuts the flow regulator;

attaching a second housing member to the first housing member, the second housing member comprising a compressor inlet and an end face, such that the second housing member surrounds the sleeve assembly and the end face abuts the open second end of the sleeve; and

attaching a third housing member to the second housing member, the third housing member having a discharge outlet.

[0019]

[0020] The sleeve assembly may further comprise a rotor having a first rotational axis, and the sleeve may comprise a second rotational axis parallel to and offset from the first rotational axis such that a channel is formed between the sleeve and the rotor.

[0021] The sleeve assembly may further comprise:

a primary vane having one end in swivel engagement with the sleeve and the other end in sliding engagement with the rotor such that the rotor is operable to drive the sleeve, and vice versa, and

at least one secondary vane, the primary vane and the at least one secondary vane partitioning the channel into a plurality of chambers.

[0022] The second housing member may further comprise at least one discharge hole disposed on the end face, and the method may further comprise assembling at least one valve for controlling the respective discharge holes.

CLAIMS

1. A revolving vane compressor, comprising:

a rotor having a first rotational axis;

a sleeve configured to surround the rotor along a direction parallel to the first rotational axis, the sleeve having a second rotational axis parallel to and offset from the first rotational axis such that a channel is formed between the sleeve and the rotor, the sleeve further having open first and second ends;

a primary vane having one end in swivel engagement with the sleeve and the other end in sliding engagement with the rotor such that the rotor is operable to drive the sleeve, and vice versa;

at least one secondary vane, the primary vane and the at least one secondary vane partitioning the channel into a plurality of chambers;

a stationary flow regulator configured to abut the open first end of the sleeve;

a first housing member configured to receive the flow regulator, wherein the first housing member forms a unitary construction with the flow regulator;

wherein the flow regulator is shaped such that, in a first rotational position of the sleeve relative to the flow regulator, one of the plurality of chambers is in fluid communication with a compressor inlet for drawing a compressible fluid into said chamber, and in a second rotational position of the sleeve relative to the flow regulator, the flow regulator seals said chamber for compressing the fluid within said chamber.

2. The revolving vane compressor as claimed in any one of the preceding claims, further comprising a second housing member positioned to surround the sleeve, wherein the second housing member comprises an end face configured to abut the open second end of the sleeve, the end face having at least one discharge hole.

3. The revolving vane compressor as claimed in claim 2, wherein the one of the plurality of chambers is in fluid communication with the at least one discharge

hole in a third rotational position of the sleeve relative to the flow regulator, for discharging the fluid.

4. The revolving vane compressor as claimed in claims 2 or 3, further comprising at least one valve configured to control the respective discharge holes.

5. The revolving vane compressor as claimed in any one of claims 2 to 4, wherein at least one of a position and a size of the at least one discharge hole is configured to provide a constant discharge rate.

6. The revolving vane compressor as claimed in any of the preceding claims, further comprising a third housing member positioned downstream of the second housing member, the third housing member further comprising a discharge outlet in fluid communication with the at least one discharge hole to discharge the compressible fluid.

7. A method of operating a revolving vane compressor, the method comprising:

partitioning a fluid channel formed between a rotor and a sleeve into a plurality of chambers;

rotating the rotor about a first rotational axis to drive the sleeve to a first rotational position relative to a stationary flow regulator, wherein the flow regulator forms a unitary construction with a first housing member of the compressor, and wherein a chamber fluidly communicates with a compressor inlet;

drawing a predetermined quantity of compressible fluid into the chamber by further rotating the rotor from the first rotational position to a second rotational position, wherein the flow regulator seals said chamber from the compressor inlet for compressing the compressible fluid within said chamber;

compressing the compressible fluid within said chamber by further rotating the rotor from the second rotational position to a third rotational position; and

discharging the compressible fluid from said chamber through at least one discharge hole at the third rotational position.

8. The method as claimed in claim 7, wherein partitioning the fluid channel into a plurality of chambers comprises using a primary vane and at least one secondary vane.

9. The method as claimed in claim 8, further comprising repeating the drawing, compressing and discharging steps for each additional chamber of the

plurality of chambers, the compressor thereby producing a plurality of discharges per each complete revolution.

10. The method as claimed in any one of claims 7 to 9, wherein discharging the compressible fluid comprises controlling at least one discharge hole using respective valves.

11. A method of manufacturing a revolving vane compressor, the method comprising the steps of:

providing a first housing member;

assembling a flow regulator to the first housing member such that the flow regulator is rotationally fixed relative to the first housing member and forms a unitary construction with the first housing member;

assembling a sleeve assembly to the flow regulator, the sleeve assembly comprising a sleeve having open first and second ends, such that the open first end of the sleeve abuts the flow regulator;

attaching a second housing member to the first housing member, the second housing member comprising a compressor inlet and an end face, such that the second housing member surrounds the sleeve assembly and the end face abuts the open second end of the sleeve; and

attaching a third housing member to the second housing member, the third housing member having a discharge outlet.

12. The method as claimed in claim 11, wherein the sleeve assembly further comprises a rotor having a first rotational axis, and wherein the sleeve comprises a second rotational axis parallel to and offset from the first rotational axis such that a channel is formed between the sleeve and the rotor.

13. The method as claimed in claim 12, wherein the sleeve assembly further comprises:

a primary vane having one end in swivel engagement with the sleeve and the other end in sliding engagement with the rotor such that the rotor is operable to drive the sleeve, and vice versa, and

at least one secondary vane, the primary vane and the at least one secondary vane partitioning the channel into a plurality of chambers.

14. The method as claimed in any one of claims 11 to 13, wherein the second housing member further comprises at least one discharge hole disposed on the end face, and wherein the method further comprises assembling at least one valve for controlling the respective discharge holes.

15. The method as claimed in claim 14, further comprising adjusting at least one of a size and a position of at least one discharge hole such that a discharge rate of the compressor is constant.

16. The method as claimed in claim 14 or 15, wherein the third housing member is attached to the second housing member such that the discharge outlet is in fluid communication with the at least one discharge hole.