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(54) **VANE COMPRESSOR WITH INTEGRATED MOTOR**

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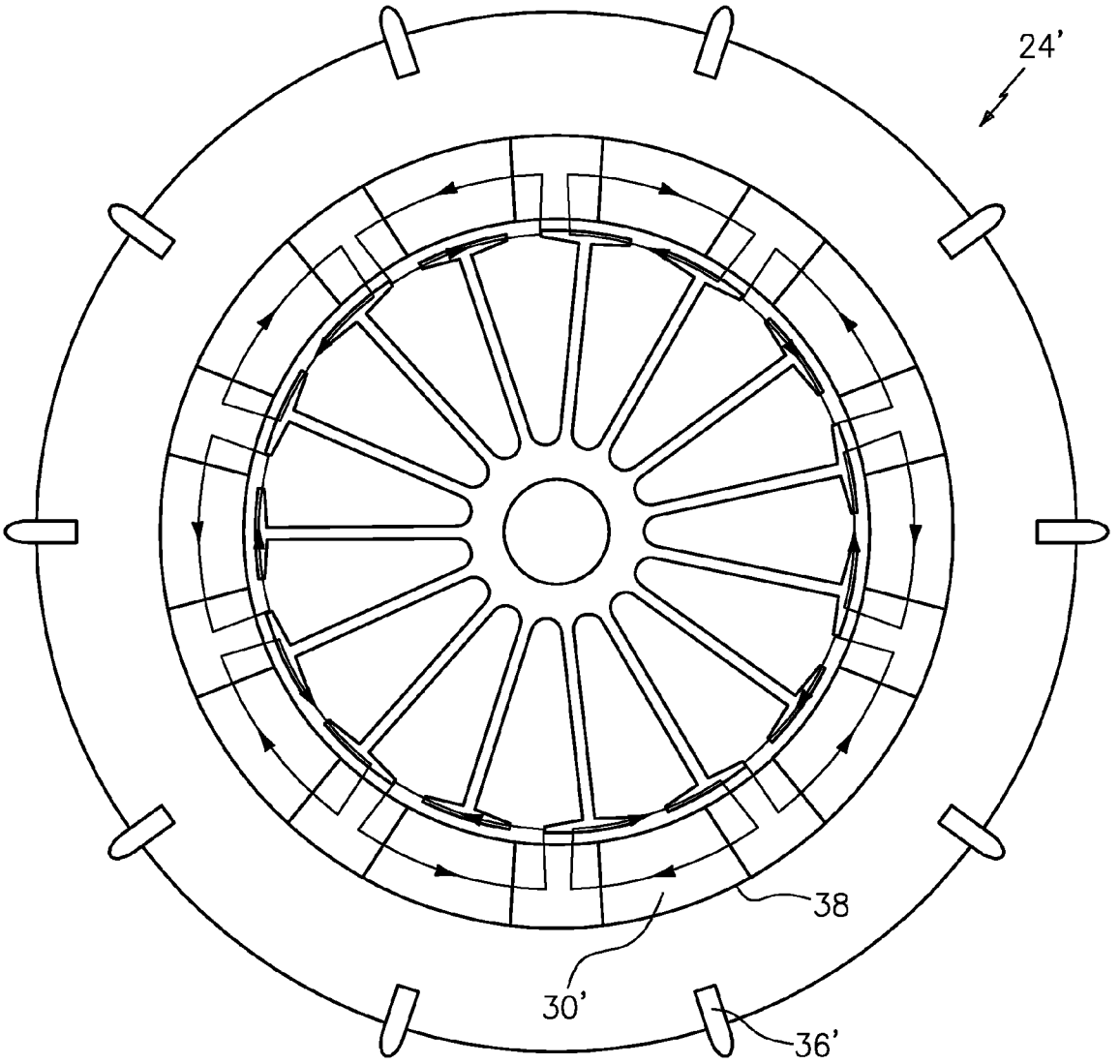
(57) **ABSTRACT**

A rotor disk of a vane compressor includes a multiple of slots along an outer diameter and a multiple of magnets along an inner diameter. Each of the multiple of slots is radially aligned with one of the multiple of magnets.



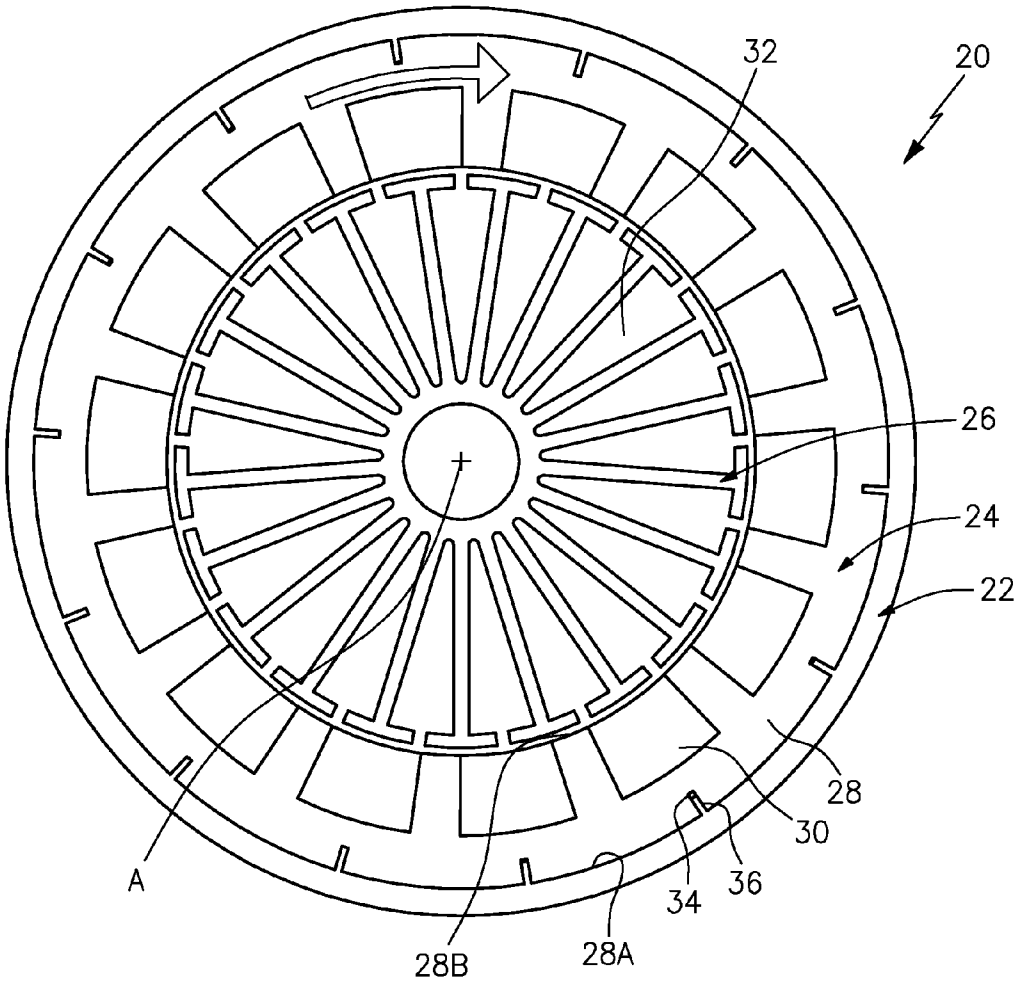


FIG. 1

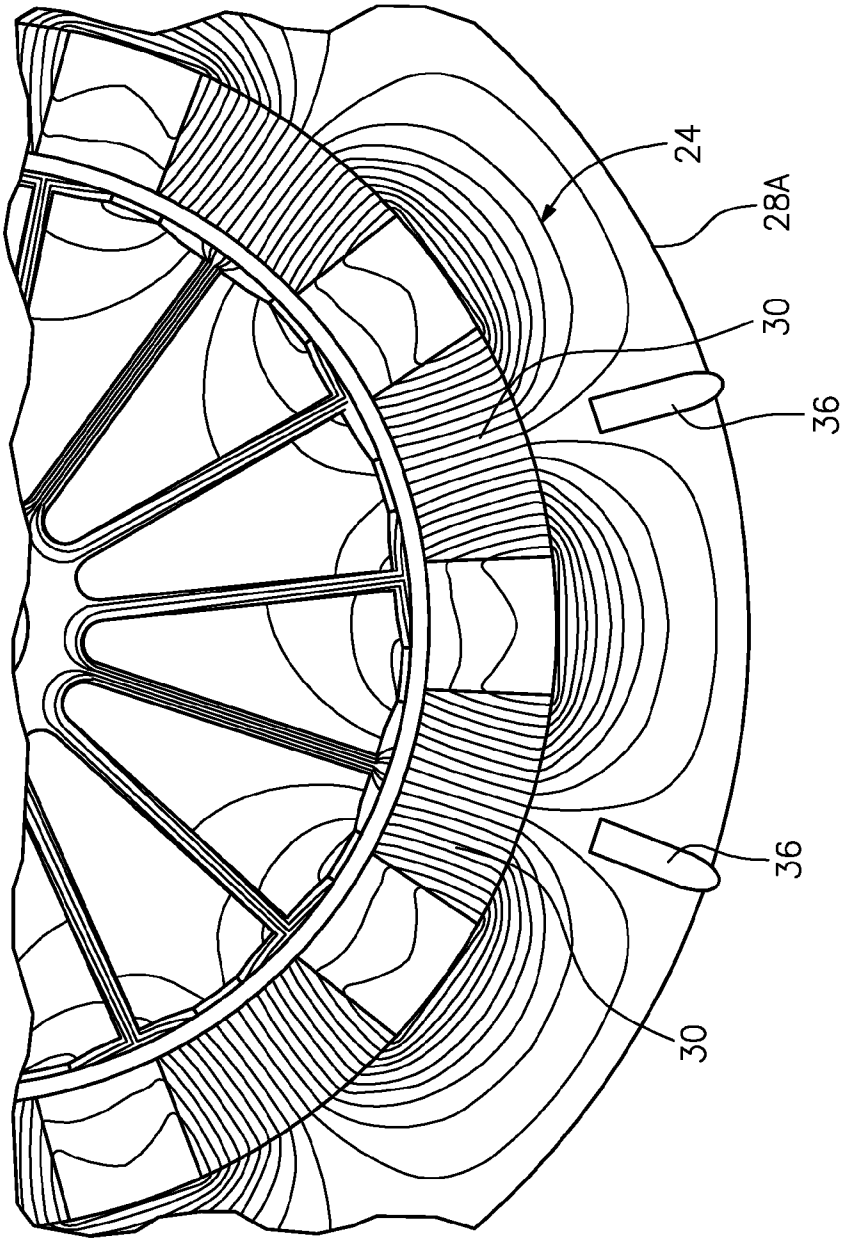


FIG. 2

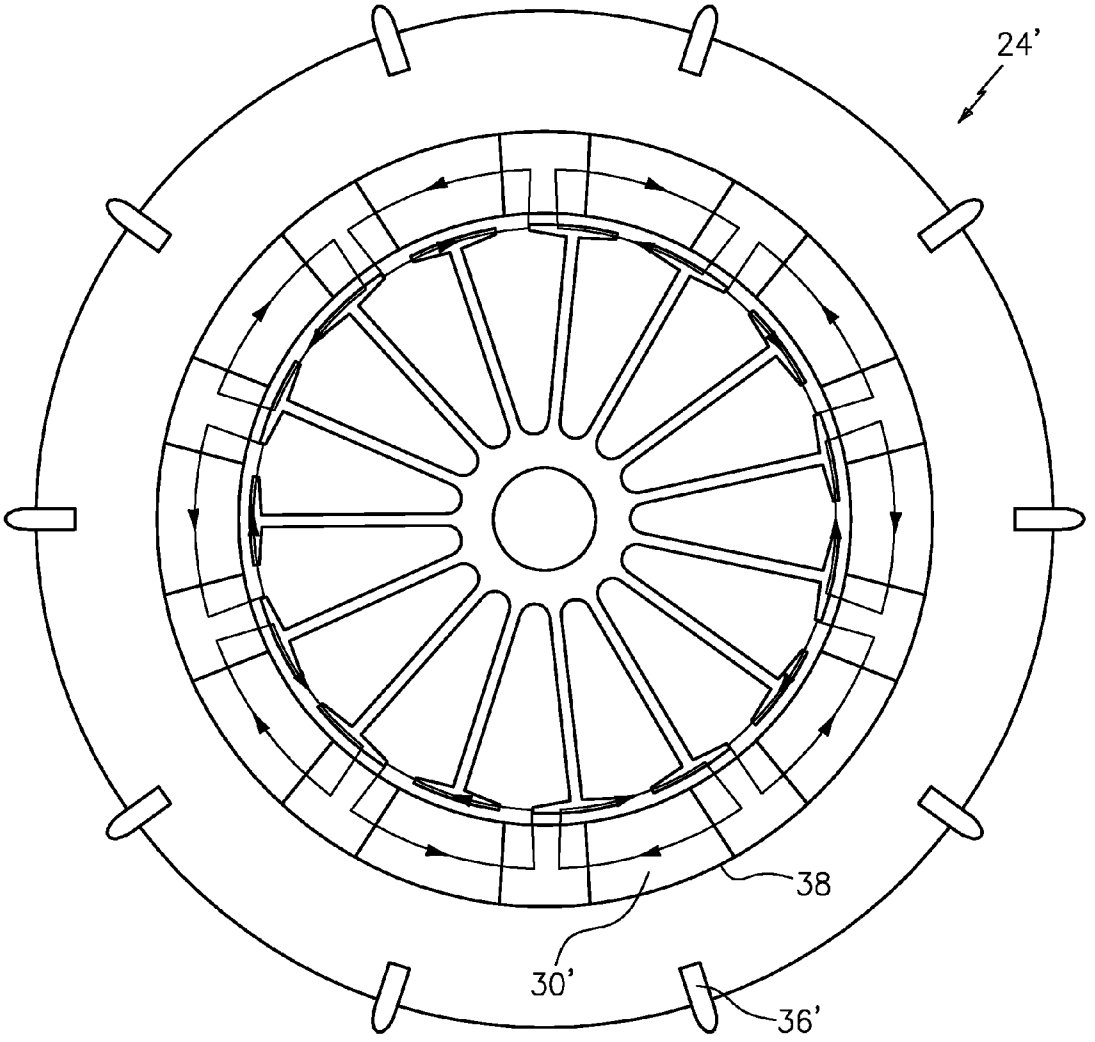


FIG. 3

VANE COMPRESSOR WITH INTEGRATED MOTOR

BACKGROUND

[0001] The present disclosure relates to a vane compressor and more particularly to a vane compressor with an integral motor.

[0002] Rotary vane compressors utilize vanes that work with a cam or sealing surface to form a series of decreasing volumes. With suitable port connections, the rotary vane compressor may operate as a pump.

SUMMARY

[0003] A rotor according to an exemplary aspect of the present disclosure includes a rotor disk with a multiple of slots along an outer diameter and a multiple of magnets along an inner diameter. Each of the multiple of slots is radially aligned with one of the multiple of magnets.

[0004] A rotary vane compressor according to an exemplary aspect of the present disclosure includes a rotor within a non-circular cam. A stator within the rotor forms a motor to rotate the rotor within the non-circular cam about the stator.

[0005] A method of minimizing a rotor diameter within a rotary vane compressor according to an exemplary aspect of the present disclosure includes locating each of a multiple of vanes within respect to a magnetic field to minimize disruption to the magnetic field.

BRIEF DESCRIPTION OF THE DRAWINGS

[0006] Various features will become apparent to those skilled in the art from the following detailed description of the disclosed non-limiting embodiment. The drawings that accompany the detailed description can be briefly described as follows:

[0007] FIG. **1** is a general schematic view of a rotary compressor system;

[0008] FIG. **2** is a schematic view of the magnetic field lines within the rotary compressor system and the location of the vanes thereto in one non-limiting embodiment; and

[0009] FIG. **3** is a schematic view of another non-limiting embodiment of the rotary compressor system with the magnets arranged 90 degrees from the non-limiting embodiment of the FIG. **2**

DETAILED DESCRIPTION

[0010] FIG. **1** schematically illustrates a rotary compressor system **20**. The rotary compressor system **20** generally includes a non-circular cam **22**, a rotor **24** and a stator **26**. The rotor **24** includes a rotor disk **28** with a multiple of magnets **30**. The rotor disk **28** interacts with the stator **26** to form an integral motor **32** to drive the rotor **24** about an axis of rotation A within the non-circular cam **22**. The integral motor **32** is essentially an inside-out motor at the center of the rotary compressor system **20** which reduces the overall size and weight of the system through combination of several components.

[0011] The rotor disk **28** defines a multiple of slots **34** spaced apart about an outer diameter **28**A thereof within which a movable vane **36** is respectively located. Each vane **36** is extensible and retractable within one of the respective slots **34** to form a seal with the non-circular cam **22**. The magnets **30** are located along an inner diameter **28**B of the rotor disk **28**. The magnets **30** may be axially integrated within the rotor disk **28**.

[0012] The number of phases of the motor **32** is matched to the number of vanes **36**. That is, each vane **36** is associated and radially aligned with each magnet **30** to facilitate a reduction in the size of the rotor disk **28** as the vanes **36** may thereby be located closer to the inner diameter **28**B without disruption to the magnetic field (FIG. **2**). That is, each vane **36** is radially aligned with each magnet **30** such that each vane **36** is nestled between the magnetic field lines formed between associated magnets **30**.

[0013] With reference to FIG. **3**, the magnets **30'** may be rotated 90 degrees as compared to the non-limiting embodiment described above. The rotation of the magnets **30'** removes the need for a back iron from an electromagnetism standpoint permits location of the vanes **36'** to be located adjacent to the magnets **30'**. A relatively small ring **38** may be located about the magnets **30'** for mechanical support to further reduce the outer radius of the rotor **24'** and reduce the overall size of the compressor system.

[0014] Integration of the motor **32** minimizes the potential for rotor tipping and reduces the number of complex parts.

[0015] It should be understood that like reference numerals identify corresponding or similar elements throughout the several drawings. It should also be understood that although a particular component arrangement is disclosed in the illustrated embodiment, other arrangements will benefit herefrom.

[0016] Although particular step sequences are shown, described, and claimed, it should be understood that steps may be performed in any order, separated or combined unless otherwise indicated and will still benefit from the present disclosure.

[0017] The foregoing description is exemplary rather than defined by the limitations within. Various non-limiting embodiments are disclosed herein, however, one of ordinary skill in the art would recognize that various modifications and variations in light of the above teachings will fall within the scope of the appended claims. It is therefore to be understood that within the scope of the appended claims, the disclosure may be practiced other than as specifically described. For that reason the appended claims should be studied to determine true scope and content.

What is claimed is:

1. A rotor comprising:
- a rotor disk with a multiple of slots along an outer diameter of said rotor disk; and
- a multiple of magnets located along an inner diameter of said rotor disk, each of said multiple of slots radially aligned with one of said multiple of magnets.

2. The rotor as recited in claim **1**, further comprising a vane mounted within each of said multiple of slots.

3. The rotor as recited in claim **1**, wherein said multiple of magnets are located axially within the rotor disk.

4. The rotor as recited in claim **1**, wherein said multiple of magnets are oriented to avoid need for a back iron.

5. The rotor as recited in claim **1**, wherein said multiple of magnets are oriented to define a circumferential magnetic field.

6. A rotary vane compressor comprising:
- a non-circular cam;
- a rotor within said non-circular cam; and
- a stator within said rotor to form a motor to rotate said rotor within said non-circular cam about said stator.

7. The vane compressor as recited in claim **6**, wherein said rotor includes a rotor disk with a multiple of slots along an outer diameter and a multiple of magnets along an inner diameter, each of said multiple of slots radially aligned with one of said multiple of magnets.

8. The vane compressor as recited in claim **6**, further comprising a vane mounted within each of said multiple of slots to form a seal with said non-circular cam.

9. The vane compressor as recited in claim **6**, wherein said multiple of magnets are oriented to define a circumferential magnetic field.

10. A method of minimizing a rotor diameter within a rotary vane compressor comprising:

locating each of a multiple of vanes within respect to a magnetic field to minimize disruption to the magnetic field.

11. The method as recited in claim **10**, further comprising locating each of the multiple of vanes radially outboard of a respective magnet.

12. The method as recited in claim **10**, further comprising circumferentially orienting the magnetic field.

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