



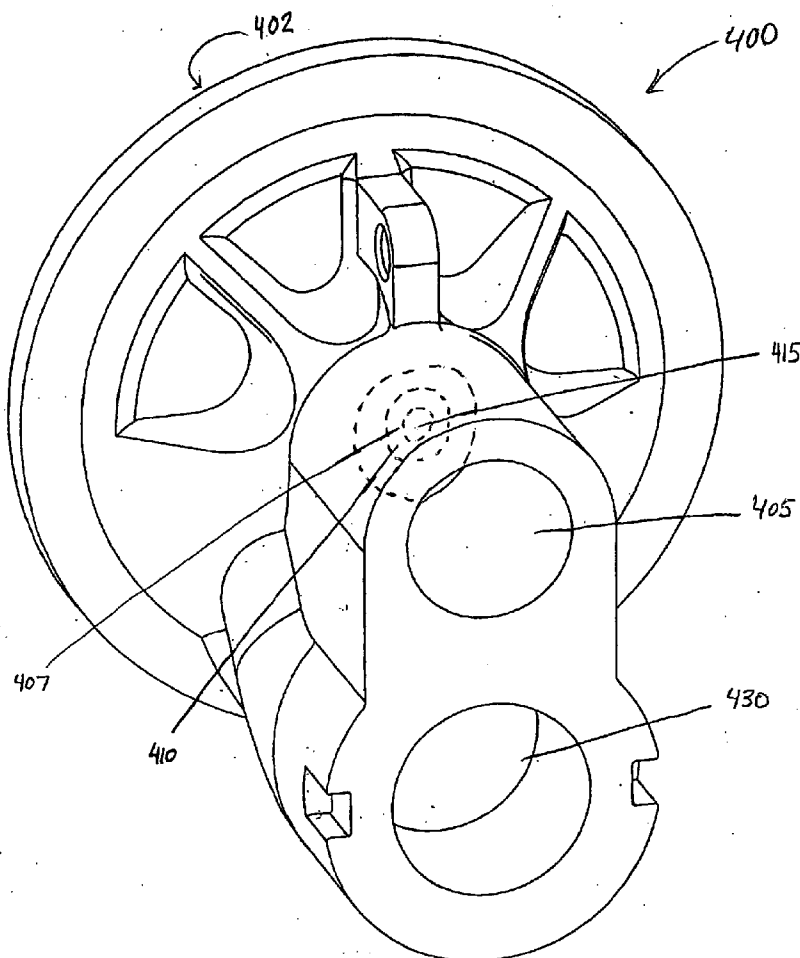
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(19) **United States**(12) **Patent Application Publication****Fox et al.**(10) **Pub. No.: US 2006/0165543 A1**(43) **Pub. Date: Jul. 27, 2006**(54) **SCREW COMPRESSOR ACOUSTIC
RESONANCE REDUCTION****Publication Classification**(51) **Int. Cl.****F04C 2/00** (2006.01)**F01C 1/16** (2006.01)**F04C 18/00** (2006.01)**F01C 1/24** (2006.01)(52) **U.S. Cl. 418/201.1**(75) Inventors: **William Joseph Fox**, Dover, PA (US);
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RATION, York, PA(21) Appl. No.: **11/042,949**(22) Filed: **Jan. 24, 2005**(57) **ABSTRACT**

A screw compressor for acoustic resonance reduction and refrigeration systems including the screw compressor are disclosed. The screw compressor has an acoustic barrier integral with the compressor housing for use with a slide valve assembly that includes a piston connected to a slide valve. A shaft connecting the slide valve and the piston passes through an aperture in the barrier with the piston and the slide valve disposed on opposite sides of the barrier. The acoustic barrier protects the piston from discharge pulses of compressed fluid exiting the rotors of the screw compressor, thus attenuating acoustic resonance, reducing compressor noise and premature wear of the slide valve assembly and compressor housing.



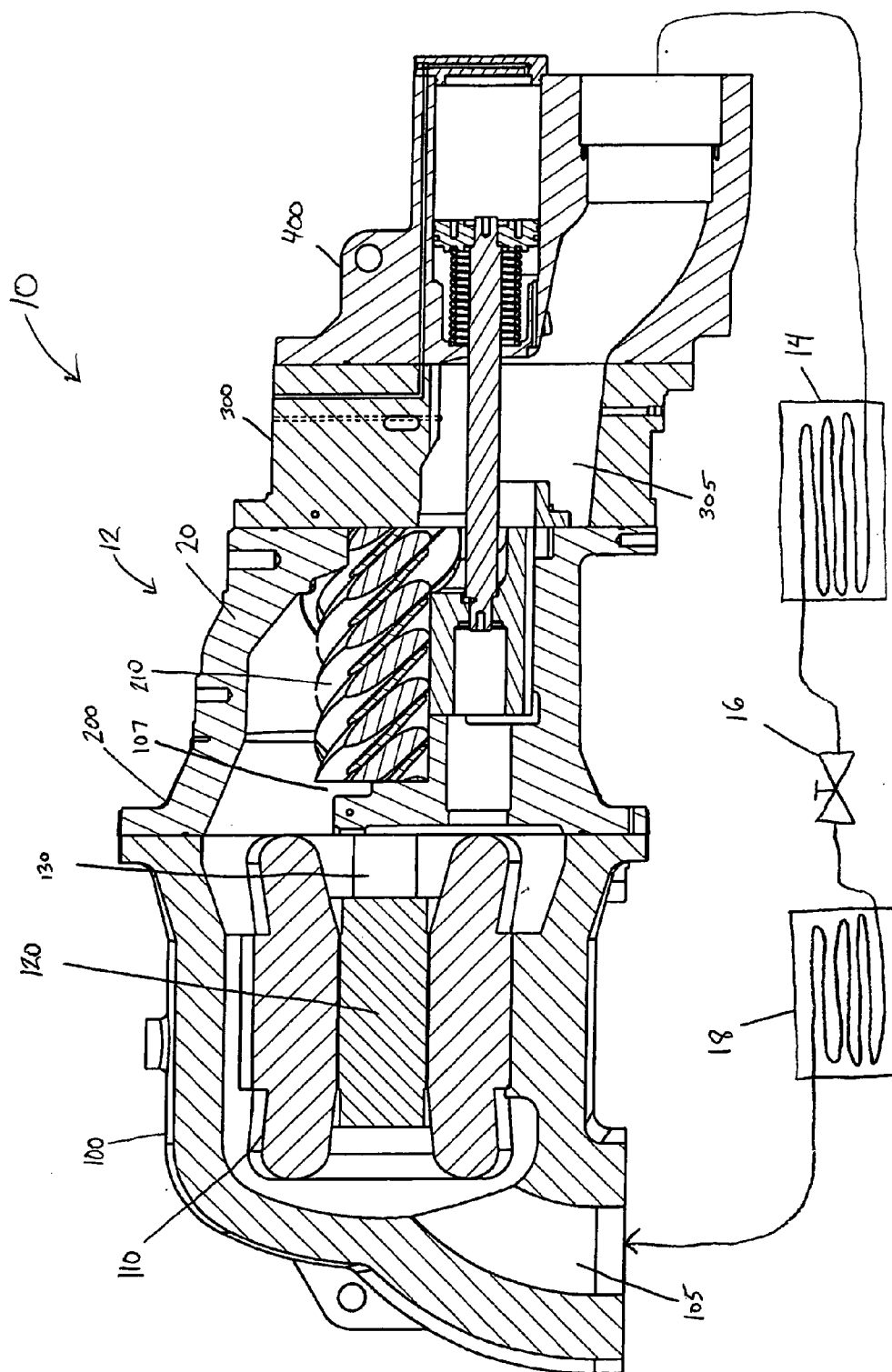
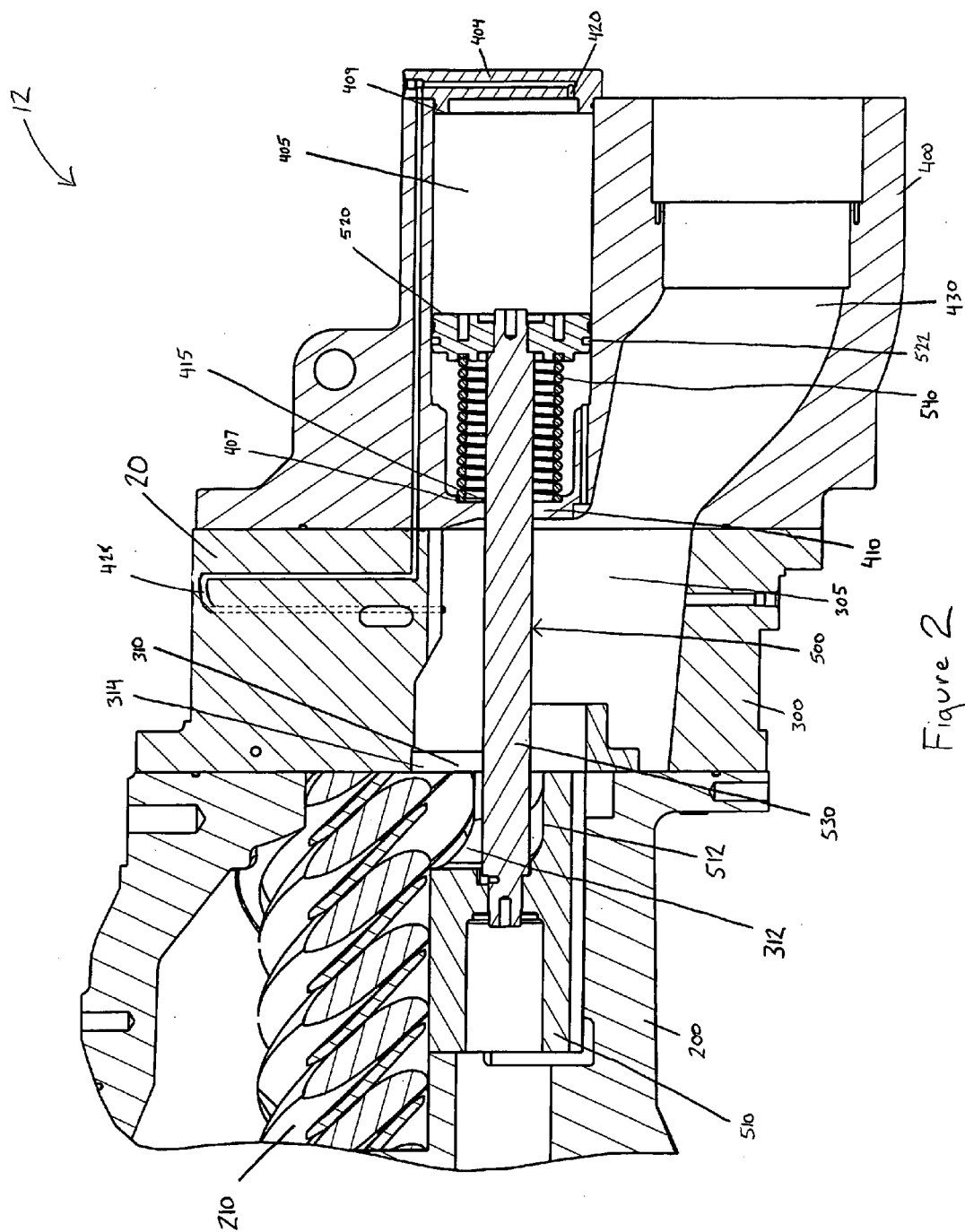
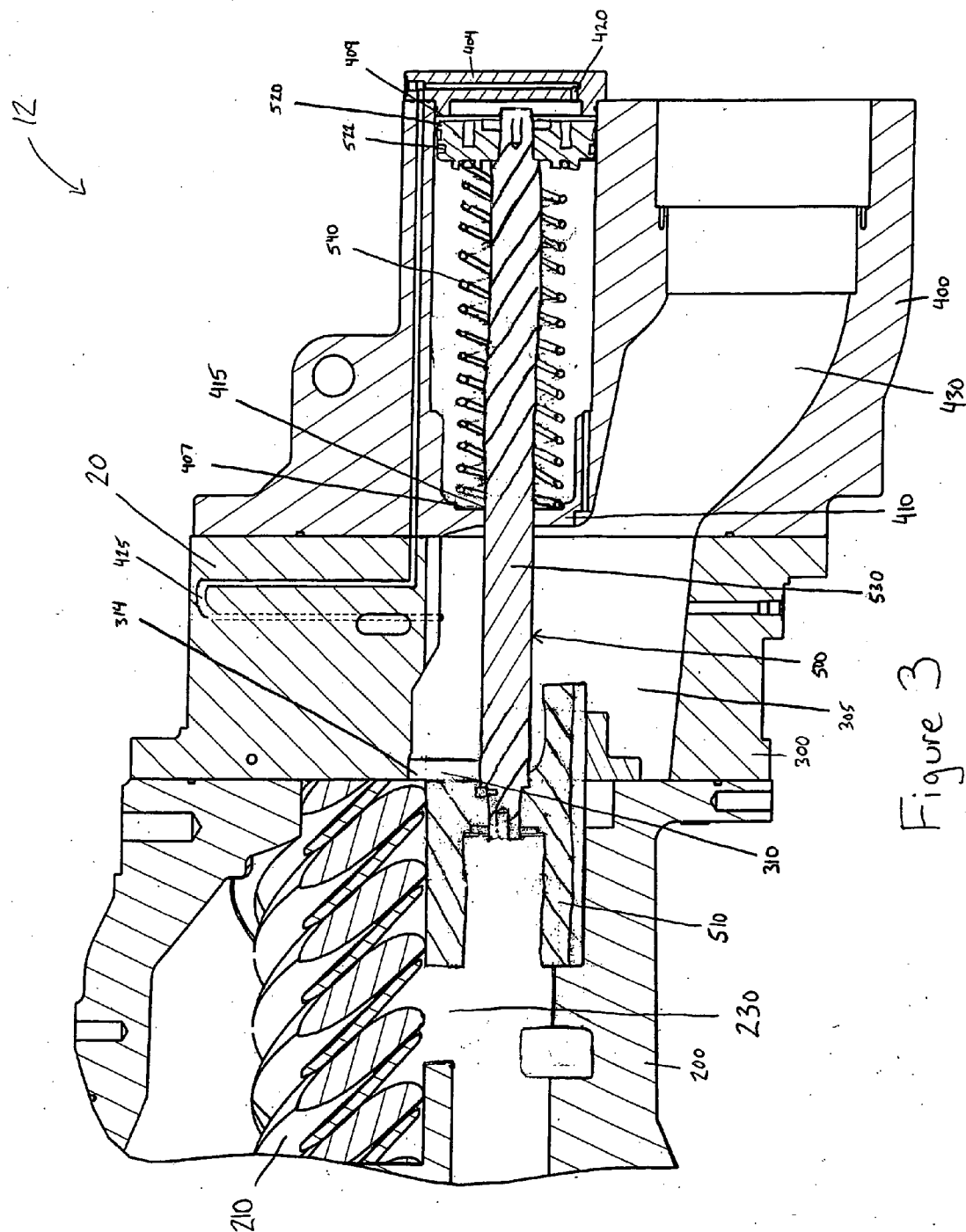


Figure 1





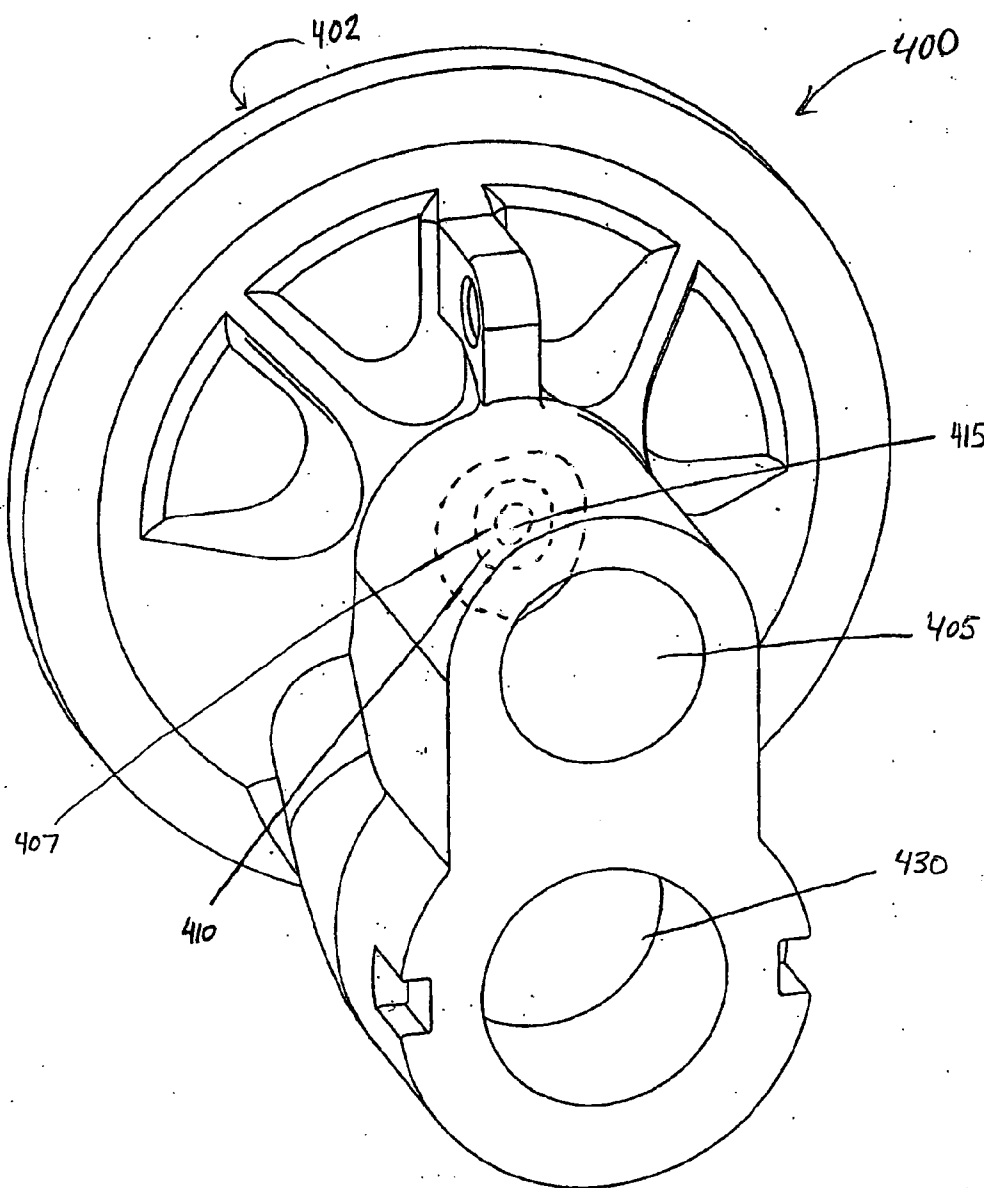


Figure 4

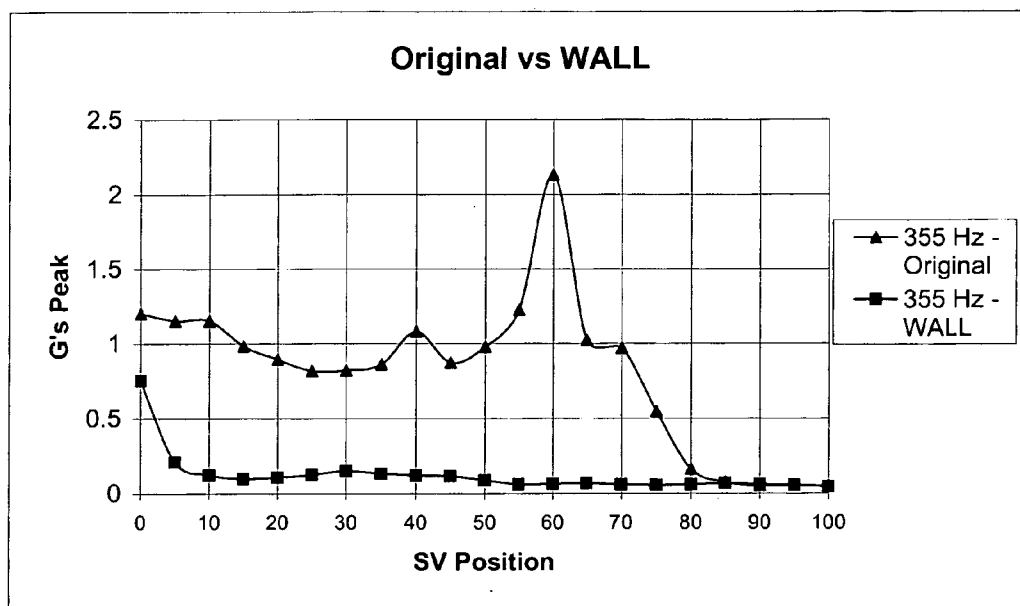


Figure 5

SCREW COMPRESSOR ACOUSTIC RESONANCE REDUCTION

FIELD OF THE INVENTION

[0001] The present invention is directed to a screw compressor having a slide valve used in gas compression, and more particularly to a screw compressor for use in heating, ventilation, air conditioning and refrigeration systems that reduces acoustic resonance, slide valve and compressor housing wear, and compressor noise levels.

BACKGROUND OF THE INVENTION

[0002] Screw compressors are widely used to compress many types of gases, particularly those used in heating, ventilation, air conditioning and refrigeration (HVAC&R) systems. The capacity of the screw compressor is typically regulated by a mechanism called a slide valve.

[0003] Rotary screw compressors of the type which are utilized for compressing a refrigerant gas or other fluid conventionally include a pair of rotors having intermeshing lands and grooves helically disposed about the periphery thereof. A working fluid enters the compressor from an inlet port and enters the grooves between the rotors. The rotation of the rotors forms chevron-shaped compression chambers in which the working fluid is received and which chambers diminish in volume as the chambers move toward an outlet in the compressor's outlet casings. The working fluid is discharged when the crest of the rotor lands defining the leading edge of a compression chamber pass an edge of the discharge ports in the discharge casing of the compressor. Lubricant is provided to the rotors to lubricate the contacting metal and to seal the compression chamber.

[0004] To provide a controlled variation in volumetric capacity simultaneously with controlling compression ratio, it has been known to utilize a slide valve, which communicates along its full length with the bores of the compressor in which the rotors are mounted. The end of the slide valve is moveable relative to the rotors and its position is used to control the amount of working fluid being compressed and thus vary the overall capacity of the compressor in a controlled manner. The slide valve configurations of rotary screw compressors allow an infinitely variable capacity to be maintained, which simultaneously results in very efficient compressor loading.

[0005] The position of the slide valve is controlled by pressures in a cylinder which act on a piston attached to the slide valve via a shaft, which together make a slide valve assembly. The rotors of the screw compressor rotate at high rates of speed, and multiple sets of rotors and/or compressors may be configured to work together to further increase the amount of fluid that can be circulated in the system, thereby increasing the operating capacity of a system. While the rotors provide a continuous pumping action, each set of rotors and/or compressor produces pressure pulses as the pressurized working fluid is discharged at the discharge port. Typically, the entire slide valve assembly is exposed to the discharge pulses as the working fluid leaves the rotors. These discharge pulses are of very high energy and may result in vibrations causing excessive wear to the slide valve assembly and increased noise levels in the compressor. Notably, the pulses reflect off of the piston and are transmitted back through the shaft to the slide valve.

[0006] At certain slide valve positions, the distance from the discharge port to the piston is equal to one half of an acoustic wavelength of the discharge pulse. When operating at these positions, a resonance is created that multiplies the effect of the discharge pulse on the slide valve assembly. This in turn cause even faster wear to the slide valve assembly, including the slide valve, piston seal and mating surfaces of the slide valve assembly with the compressor housing. These vibrations are also transmitted to the compressor housing.

[0007] U.S. Pat. No. 5,979,168 discloses a slide valve for use in a screw compressor that reduces the size of the volume available for compression by opening a portion of the volume to suction pressure. The slide valve is gas operated by, and is in fluid communication with, gas from a single source, the refrigerant gas from the discharge pressure side of the screw compressor. The apparatus of the '168 Patent includes a slide valve assembly having a valve portion, a piston and a connecting rod connecting the valve portion to the connecting rod. Discharge gas from the compression chambers is discharged into a discharge passage. A partition member is positioned in the discharge passageway and includes an aperture penetrated by the connecting rod. The partition member forms a barrier for lubricant discharged with the gas flow stream, but gas is allowed to pass through the aperture in the partition member. As a result, the gas on either side of the aperture is at the same pressure, but the gas passing through the aperture is essentially free of lubricant. The partition member also includes a weepage hole to drain any small amount of lubricant that may make its way through the aperture to the opposite side of the partition member.

[0008] The stated purpose of the '168 Patent is to reduce lubricant in the gas admitted into the valve to operate the slide valve, but it does not recognize the problem of vibration and acoustic resonance.

[0009] U.S. Pat. No. 5,044,894 discloses a double piston system for adjusting a slide valve and a slide stop of a screw compressor. The pistons of the '894 Patent are located in a control housing forming two separate piston chambers. Concentric annular rods extend from the pistons, through the control housing, to the slide valve and slide stop. Oil supplied from an oil separator is applied to the piston chambers to cause movement of the pistons and a resulting change in slide valve and slide stop positions. Seals on the rods seal the piston chambers from one another and from the discharge chamber. While the two piston system of the '894 Patent opines that the use of the seals on the rods could isolate the pistons from variations in the discharge manifold, it fails to recognize the problems caused by the reflection of energy from discharge pulses through the slide valve assembly, including acoustic resonance, noise, and excessive wear. Furthermore, because oil is introduced to the piston chambers, the '894 Patent presents a different mechanical system having a different resistance and likely different damping characteristics which may not produce a resonance.

[0010] In view of the foregoing, there remains a need to provide for a screw compressor that attenuates acoustic resonance and reduces wear of the compressor housing and slide valve and reduces compressor noise levels.

SUMMARY OF THE INVENTION

[0011] Accordingly, it may be desirable to provide a screw compressor that overcomes these and other disadvantages in the art. Particularly, it is desirable to provide a screw compressor that provides for a slide valve assembly that separates the piston from the discharge by introducing a damping device between the piston and the slide valve. More particularly, it may be desirable to provide a screw compressor that has a damping device integral with the compressor housing, which damping device separates the piston from the discharge port and dampens sound, vibration and noise in the compressor.

[0012] The present invention is directed to screw compressors and compression systems that include the screw compressors. The screw compressor comprises a compressor housing having a passage for the flow of a fluid there-through from a suction side of the compressor to a discharge side of the compressor, the housing including an integral acoustic barrier, a pair of intermeshed rotors disposed in the passage, the rotors configured to increase the pressure of the fluid flowing from a suction port on the suction side of the compressor through the passage to a discharge port on the discharge side of the compressor, and a slide valve assembly movably disposed within the compressor housing to adjust the capacity of the compressor, the slide valve assembly comprising a slide valve connected to a piston by a shaft, wherein the piston and the slide valve are disposed on opposite sides of the acoustic barrier. The acoustic barrier includes an aperture sized to receive the shaft, the acoustic barrier attenuating acoustic resonance and noise in the compressor and the acoustic barrier is positioned a preselected distance from the discharge port.

[0013] The present invention is also directed to a method of attenuating acoustic resonance in a screw compressor. The method comprises passing a refrigerant gas through a passage of a compressor housing of a screw compressor from a suction side of the compressor to a discharge side of the compressor through a discharge port, a portion of the passage defined by a pair of intermeshed rotors disposed in the compressor housing passage, providing an acoustic barrier integral with the compressor housing, the acoustic barrier positioned a preselected distance from the discharge port, providing a slide valve assembly in the compressor housing, the slide valve assembly comprising a slide valve connected by a shaft to a piston, wherein the shaft passes through an aperture defined by a barrier integral with the compressor housing, the slide valve and the piston on opposite sides of the barrier, and modifying the flow of the refrigerant gas through the passage by moving the slide valve from a first position with respect to the intermeshed rotors to a second position with respect to the intermeshed rotors.

[0014] An advantage of the present invention is that an integral acoustic barrier placed between the piston of the slide valve assembly and the discharge from the rotors greatly reduces the possibility of creating an acoustic resonance resulting from periodic discharge of compressed refrigerant gas from the compression chambers as the integral barrier attenuates sound and vibration.

[0015] Another advantage of the present invention is that an integral acoustic barrier placed between the piston of the slide valve assembly and the discharge from the rotors reduces wear to the slide valve assembly.

[0016] Yet another advantage of the present invention is that an integral acoustic barrier placed between the piston of the slide valve assembly and the discharge from the rotors decreases compressor noise levels.

[0017] Still another advantage of the present invention is that an acoustic barrier formed integrally with the compressor housing can be produced as part of the manufacturing process of the compressor housing, decreasing the number of additional parts in the compressor housing, reducing possible sources of leaks and potential failures, while simplifying assembly.

[0018] Other features and advantages of the present invention will be apparent from the following more detailed description of the preferred embodiment, taken in conjunction with the accompanying drawings which illustrate, by way of example, the principles of the invention.

BRIEF DESCRIPTION OF THE DRAWINGS

[0019] FIG. 1 is a refrigeration system according to an exemplary embodiment of the invention.

[0020] FIG. 2 is an enlarged partial cross-sectional view showing the slide valve assembly of the screw compressor in the refrigeration system of FIG. 1, showing the compressor in a fully loaded position.

[0021] FIG. 3 is the enlarged partial cross-sectional view of FIG. 2 showing the compressor in a fully unloaded position.

[0022] FIG. 4 is a perspective view of a piston housing portion of a compressor housing.

[0023] FIG. 5 is a graphical representation of results of screw compressor vibration testing.

DETAILED DESCRIPTION OF THE INVENTION

[0024] Introducing a barrier integral with a compressor housing of a screw compressor to separate the piston and slide valve portions of a slide valve assembly physically separates the piston from the discharge gases. The discharge gases are high pressure gases produced as the gases exit each of a number of compression chambers formed between intermeshed screws or rotors. The gases are discharged from the compression chambers in a periodic manner as the rotor or rotors rotate, producing pulses. The frequency and amplitude of the pulses are dependent on a number of factors, including but not limited to rotational speed of the rotors, as well as the number of compression chambers available for compression. Consequently, due to the position of the integral barrier, the pulses are attenuated and less energy is absorbed by the piston and reflected back through the slide valve assembly through the shaft, thereby reducing the amount of vibration in the slide valve assembly and decreasing the risk of premature wear of the assembly. Not only does the attenuation of vibrations or pulses lower the acoustic resonance, but the distance from the discharge port to the point of energy absorption is fixed. That is, the energy is now absorbed by the barrier which remains a constant distance from the discharge port, even while the distance of the piston is varied from both the discharge port and the integral barrier. By appropriately selecting the distance from the discharge port to the integral barrier, the possibility of

acoustic resonance is further reduced as the distance selected should correspond to an acoustic wavelength that does not result in resonance during normal compressor operation.

[0025] Referring first to **FIG. 1**, a refrigeration system **10** comprises a screw compressor **12**, a condenser **14**, an expansion valve (TVX) **16** and an evaporator **18** serially connected to permit the flow of refrigerant therethrough. The compressor **12** includes a compressor housing **20** that contains the working parts of the compressor **12**. As shown in **FIG. 1**, the compressor housing **20** comprises an intake housing **100**, a rotor housing **200**, a discharge housing **300**, and a piston housing **400**.

[0026] Refrigerant gas at suction or low pressure is directed from the evaporator **18** to a communicating suction area at an intake passage on the suction side **105** of the compressor **12**. A motor is used to drive the rotors. The motor may include a motor stator **110** comprised of laminations and coil heads. The motor further includes a motor drive **120** connected to a rotor **210** by way of a drive shaft **130**, which rotor **210** is matingly engaged with a second rotor (not shown) via intermeshing lands and grooves. The rotors revolve in an accurately machined cylinder with the rotor housing **200**. The two rotors are not of the same shape. Rather, one is generally termed a male and the other is generally termed a female. One rotor, usually the male, typically rotates or revolves more rapidly than the other rotor, usually the female.

[0027] Refrigerant at suction pressure flows into the rotor housing **200** at a suction port **107** and enters compression pockets defined between the surfaces of the mating rotors. By the counter rotation and meshing of the screw rotors, the compression pockets, also referred to as lobes, are reduced in size and are axially displaced to the high pressure discharge side **305** of the compressor **12**, where the then-compressed refrigerant gas is discharged into a discharge passage **305** of the discharge housing **300**. The compressed refrigerant eventually exits the compressor **12** to the condenser **14** and continues through the refrigeration cycle. Typically, screw compressors include oil separators (not shown) for separating lubricant entrained in the compressed refrigerant from the refrigerant. In addition, a structure such as a sump (not shown) is typically included for storing the excess lubricant.

[0028] As better illustrated in **FIGS. 2 and 3**, showing the compressor **12** in a fully loaded and fully unloaded state, respectively, the compressor **12** includes a single piston slide valve assembly **500** which controls the capacity of the compressor **12**. The slide valve assembly **500** comprises a slide valve **510** and a piston **520** rigidly connected to one another by, but oppositely disposed on, a shaft **530**. The slide valve **510** forms a portion of the boundary of the rotor housing **200**, providing the ability to adjust the amount of the rotor threads exposed to the suction inlet, and the loading of the compressor **12**.

[0029] Compressed refrigerant gas exits the rotors into the discharge passage on the discharge side **305** at a discharge port **310**. The discharge port **310** is comprised of two portions, the first being a radial portion **312** which is formed by a discharge end **512** of the slide valve **510** and the second being an axial portion **314** which is formed by the discharge housing **300**. The geometry of the compressor housing **20** is such that the size of the radial portion **312** is controlled by the position of the slide valve **510**.

[0030] The slide valve assembly **500** is adjusted to control the position of the slide valve **510** over the rotors by pressure applied to the piston **520**. The piston **520** is contained in a piston cylinder **405** of the piston housing **400** sized to receive the piston **520**, the piston **520** having one or more seals **522** such that the piston **520** effectively divides the piston cylinder **405**, which is in fluid communication with the suction side **105** and the discharge side **305** of the compressor, into two distinct chambers, one chamber on either side of the piston **520**. Despite the seals, sufficient lubricity is provided so that by loading pressure to the piston **520** via either side of the piston **520**, the piston **520** is displaced and thus the rest of the slide valve assembly **500**, including the slide valve **510** which is attached to the opposite end of the slide valve shaft **530**, moves, increasing or decreasing compressor capacity.

[0031] As shown with respect to **FIG. 3**, when the slide valve **510** is unloaded, biasing means, such as a spring **540**, urges the piston **520** to the right of the cylinder **405**. This in turn moves the slide valve **510** to the right. In this position, the slide valve is said to be unloaded and the slide valve **510** reveals a recirculation port **230** for refrigerant gas to return uncompressed to the suction side **105** of the compressor **12**. To increase capacity, pressure is introduced into the piston cylinder **405** from the discharge side **305** through a piston cylinder opening **420**, counteracting the spring **540** and moving the piston **520** and hence the slide valve **510** to the left. The fully loaded position is shown in **FIG. 2**. In this position, the recirculation port **230** is fully closed. All suction gas introduced into the rotors is now compressed. When the slide valve **510** is fully unloaded, as shown in **FIG. 3**, the recirculation port **230** is fully open, allowing a portion of the refrigerant gas to by-pass the rotors, circulate around the motor and return to the suction side inlet. In a partially loaded condition, the recirculation port **230** is partially closed by the slide valve **510**.

[0032] During operation, and particularly when the slide valve assembly **500** is adjusted so that the compressor **12** is only partially loaded, compressed gas is discharged from the rotors in pulses, which pulses are typically of very high energy. As previously discussed, in screw compressor designs, this can lead to vibrations and produce an acoustic resonance that results in severe wear to the slide valve assembly **500**, including galling that can lead to premature failure of the compressor **12**.

[0033] In the present invention, an acoustic barrier **410** is introduced into the compressor housing **20** to reduce the effect of the pulses on the slide valve assembly **500** and overcome the problems of excessive vibration and wear to the assembly **500**, undesirable noise levels within the compressor **12**, as well as to overcome the significant damage such as galling of the slide valve assembly **500** that results when the distance from the piston **520** to the discharge port **310** matches an acoustic wavelength of the discharge pulse. In severe cases, the harmonic effects can damage the compressor housing **20** itself. The barrier **410** is formed integral with the compressor housing **20**, typically during casting of the compressor housing **20**.

[0034] The barrier **410** includes an aperture **415** sized to snugly receive the shaft **530** of the slide valve assembly **500**. The piston **520** and the slide valve **510** are on opposite sides of the barrier **410**, separating the piston **520** from the

discharge pulses coming from the discharge port 310. Also, as shown in FIG. 2, the barrier 410 may further define a portion of an end wall 407 of the piston cylinder 405.

[0035] It will be appreciated that the acoustic wavelength is a property of the refrigerant and may vary at different temperature and pressures of operation. Furthermore, the frequencies generated by the compressor 12 are based on rotor 210 design and operating speed of the compressor 12. Thus, it will further be appreciated that acoustic wavelengths and compressor 12 frequencies that result in resonance can vary widely, but that the acoustic barrier 410 can appropriately be positioned a preselected distance from the discharge port 310 to allow the slide valve 510 to move over the full length of a desired range while still protecting the piston 520 from pulses existing the discharge port 310.

[0036] Movement of the piston 520 is controlled by the introduction or evacuation of refrigerant into or from the chamber of the piston cylinder 405 opposite the biasing means, the piston cylinder 405 being in fluid communication with both the suction side 105 and the discharge side 305 of the compressor 12. To load the compressor 12 and increase its capacity, high pressure gas is introduced through a piston cylinder opening 420 which acts as an inlet carrying high pressure gas from the discharge side 305 of the compressor 12 through a conduit assembly 425. Conversely, to unload the compressor 12, gas may be removed through the piston cylinder opening 420 which now acts as an outlet by venting the gas to the suction side 105 of the compressor 12 through the conduit assembly 425. The function of the cylinder opening 420 as an inlet or outlet can be controlled by a solenoid valve (not shown), which is typically part of the conduit assembly. When it is necessary to load the compressor, refrigerant can be introduced through the opening 420 through the solenoid valve which places the opening 420 in fluid communication with the discharge side 305 of the compressor 12. Likewise, when it is determined that the compressor 12 should be unloaded, refrigerant can be withdrawn through the opening 420 through the solenoid valve which places the opening in fluid communication with the suction side 105 of the compressor 12. This describes well known slide valve operation.

[0037] Preferably, the slide valve assembly includes a spring 540 disposed between the piston 520 and the end wall 407 provided by the barrier 410. The end wall 407 advantageously serves as a spring stop. The spring 540 urges the piston 520 to remain in place in the absence of high pressure gas introduced through the piston cylinder opening 420, so that the slide valve 510 automatically is unloaded in the absence of high pressure gas.

[0038] The aperture 415 defined by the barrier 410 approximates the diameter of the shaft 530 but with sufficient tolerance to permit the shaft 530 to slide back and forth when the piston 520 is displaced without causing damage to the slide valve assembly 500 or the compressor housing 12. The piston 520 is designed and manufactured to allow the piston 520 to slide freely in the piston cylinder 405 without the flow of gas around the piston 520. Typically, a seal 522 is provided to prevent gas leakage around the piston 520. Thus provided, the piston 520 may be protected from discharge pulses without the need to provide any seals or other non-integral pieces on the shaft 530 of the slide valve assembly 500 or attached to the compressor housing 20.

[0039] As previously discussed, the acoustic barrier 410 is an integral part of the compressor housing 20. Preferably, the barrier 410 is cast as an integral part of the piston housing portion 400 of the compressor housing 20 although it is possible, but considerably more expensive, to machine the compressor housing 20 from a forging. As shown in FIG. 4, the piston housing 400 is a piece of unitary construction cast from iron with a mating surface 402 that attaches to the compressor housing 20. The piston housing 400 comprises two passages, the piston cylinder 405, and a second passage 430 which forms part of the discharge passage on the discharge side 305 of the compressor and which directs the compressed refrigerant to the condenser. As best seen in FIGS. 2 and 3, a piston housing end plate 404 is attached to the piston housing 400 after the slide valve assembly 500 has been assembled. The piston housing end plate 404 provides an end wall 409 of the piston cylinder 405 opposing the end wall 407 provided by the barrier 410. By producing the barrier 410 integral with the compressor housing 20, which is typically massive, particularly when compared to working components such as the slide valve assembly 500, energy from the discharge pulse is attenuated throughout the compressor housing 20 reducing the risk of damage to other working parts of the compressor 12. Certain materials, such as gray cast iron, are particularly effective in attenuating vibrations.

[0040] Screw compressors with an integral barrier according to embodiments of the present invention may be used in any compression system, but are particularly useful in refrigeration systems using high density refrigerants such as 134a, which because of its high density, is more likely to conduct the discharge pulses at higher energy levels, thus resulting in more vibration and greater damage in the absence of a barrier.

[0041] The effectiveness of embodiments of the present invention is further illustrated as shown in the following non-limiting example.

EXAMPLE

[0042] A screw compressor having a slide valve assembly according to conventional methods, i.e., without a barrier separating the piston and the slide valve was compared against a screw compressor according to an exemplary embodiment of the present invention, but the compressors were otherwise identical. Both compressors were tested using 134a refrigerant as the refrigerant gas. Compressor vibration at 355 Hz was then measured as a function of various slide valve positions. During testing, each compressor was maintained at each slide valve position long enough to achieve steady state operation.

[0043] As shown graphically in FIG. 5, which displays peak forces in G loading versus percent slide valve loading, the compressor without any barrier between the piston and slide valve exhibited significantly higher peak G's, particularly over slide valve positions from about 10 to about 80 percent, where 100 percent corresponded to a slide valve position for a fully loaded compressor while 0 percent corresponded to a slide valve position opened to allow maximum recirculation of refrigerant. FIG. 5 demonstrates that vibrations were reduced from in excess of 2 G's in screw compressors with no barrier (designated as "original") down to under about 0.2 G's in screw compressors with an integral barrier (designated as "wall"), an entire order of magnitude decrease.

[0044] While the invention has been described with reference to a preferred embodiment, it will be understood by those skilled in the art that various changes may be made and equivalents may be substituted for elements thereof without departing from the scope of the invention. In addition, many modifications may be made to adapt a particular situation or material to the teachings of the invention without departing from the essential scope thereof. Therefore, it is intended that the invention not be limited to the particular embodiment disclosed as the best mode contemplated for carrying out this invention, but that the invention will include all embodiments falling within the scope of the appended claims.

1. A screw compressor comprising:

a compressor housing having a passage for the flow of a fluid therethrough from a suction side of the compressor to a discharge side of the compressor, the housing including an integral acoustic barrier;

a pair of intermeshed rotors disposed in the passage, the rotors configured to increase the pressure of the fluid flowing from a suction port on the suction side of the compressor through the passage to a discharge port on the discharge side of the compressor; and

a slide valve assembly movably disposed within the compressor housing to adjust the capacity of the compressor, the slide valve assembly comprising a slide valve connected to a piston by a shaft, wherein the piston and the slide valve are disposed on opposite sides of the acoustic barrier and wherein the acoustic barrier includes an aperture sized to receive the shaft, the acoustic barrier attenuating acoustic resonance and noise in the compressor and wherein the acoustic barrier is positioned a preselected distance from the discharge port.

2. The screw compressor of claim 1, wherein the piston is disposed in a piston cylinder, at least a portion of piston cylinder defined by the compressor housing, the piston cylinder sized to receive the piston and in fluid communication with the suction side and the discharge side of the housing by a conduit assembly.

3. The screw compressor of claim 2, wherein the compressor housing comprises cast iron.

4. The screw compressor of claim 2, wherein the slide valve assembly includes a single piston.

5. The screw compressor of claim 2, wherein the slide valve assembly further includes a biasing means to urge the piston in a first direction and wherein a refrigerant gas introduced into the piston cylinder from the discharge side by the conduit assembly urges the piston in a direction opposed to the first direction.

6. The screw compressor of claim 2, wherein the compressor housing further includes a piston housing portion, wherein the piston housing portion includes at least a portion of the piston cylinder and at least a portion of the conduit assembly.

7. The screw compressor of claim 2, wherein the piston cylinder is sized to receive the piston such that substantially no refrigerant gas leaks across an interface between the compressor housing and the piston.

8. The screw compressor of claim 2, wherein the acoustic barrier comprises a portion of an end wall of the piston cylinder.

9. The screw compressor of claim 1, wherein the slide valve assembly further comprises a spring disposed between the piston and the acoustic barrier, the spring having a bias urging the piston away from the acoustic barrier.

10. The screw compressor of claim 1, wherein the compressor housing comprises an intake housing, a rotor housing, a discharge housing, and a piston housing.

11. A method for reducing acoustic resonance in a screw compressor comprising the steps of:

passing a refrigerant gas through a passage of a compressor housing of a screw compressor from a suction side of the compressor to a discharge side of the compressor through a discharge port, a portion of the passage defined by a pair of intermeshed rotors disposed in the compressor housing passage;

providing an acoustic barrier integral with the compressor housing, the acoustic barrier positioned a preselected distance from the discharge port;

providing a slide valve assembly in the compressor housing, the slide valve assembly comprising a slide valve connected by a shaft to a piston, wherein the shaft passes through an aperture defined by a barrier integral with the compressor housing, the slide valve and the piston on opposite sides of the barrier; and

modifying the flow of the refrigerant gas through the passage by moving the slide valve from a first position with respect to the intermeshed rotors to a second position with respect to the intermeshed rotors.

12. The method of claim 11, wherein the step of passing a refrigerant gas includes passing 134a refrigerant gas.

13. The method of claim 11, wherein the compressor housing for passing a refrigerant gas through the compressor housing comprises a cast material.

14. The method of claim 11, wherein the step of providing a slide valve assembly in the compressor housing comprises:

providing a slide valve assembly in the compressor housing such that the piston is movably disposed within a piston cylinder of the compressor housing, the piston cylinder sized to receive the piston, wherein moving the piston results in moving the slide valve, thereby modifying the flow of gas and controlling the capacity of the compressor.

15. The method of claim 14, wherein the moving of the slide valve from a first position to a second position with respect to the intermeshed rotors is accomplished by varying a pressure on one side of the piston with respect to a pressure on an opposing side of the piston.

16. The method of claim 14, wherein a portion of the compressor housing defines at least a portion of an end wall of the piston cylinder.

17. The method of claim 16, wherein the portion of the compressor housing that defines at least a portion of the end wall of the piston cylinder is the acoustic barrier.

18. The method of claim 14, wherein the step of providing a slide valve assembly further comprises:

providing a slide valve assembly further comprising a biasing means to urge the piston in a direction opposite the acoustic barrier.

19. The method of claim 14, wherein the moving of the slide valve from a first position to a second position with respect to the intermeshed rotors is accomplished by intro-

ducing a high pressure gas into the piston cylinder from the discharge side to increase pressure on one side of the piston, thereby urging the piston in a direction opposite the first direction urged by the biasing means.

20. A refrigeration system comprising:

a condenser;

an evaporator;

an expansion valve; and

a screw compressor comprising a compressor housing having a passage for the flow of a fluid therethrough from a suction side of the compressor to a discharge side of the compressor, the housing including an integral acoustic barrier, a pair of intermeshed rotors disposed in the passage, the rotors configured to increase the pressure of the fluid flowing from a suction port on the suction side of the compressor through the passage to a discharge port on the discharge side of the compressor, and a slide valve assembly movably disposed within the compressor housing to adjust the capacity of

the compressor, the slide valve assembly comprising a slide valve connected to a piston by a shaft, wherein the piston and the slide valve are disposed on opposite sides of the acoustic barrier and wherein the acoustic barrier includes an aperture sized to receive the shaft, the acoustic barrier attenuating acoustic resonance and noise in the compressor and wherein the acoustic barrier is positioned a preselected distance from the discharge port,

wherein the condenser, evaporator, expansion valve and screw compressor are serially connected for the passage of a refrigerant therethrough.

21. The refrigeration system of claim 20, wherein the slide valve assembly of the screw compressor comprises a single piston.

22. The refrigeration system of claim 20, wherein the refrigerant comprises 134a refrigerant.

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