A mounting assembly for assembling a bundle of a compressor is provided. The mounting assembly may include a plurality of biasing members and a mechanical fastener. The plurality of biasing members may be disposed in a recess formed in a first annular body of the bundle, and may be configured to apply a biasing force to a second annular body of the bundle. The mechanical fastener may extend through a mounting flange of the second annular body and the plurality of biasing members. The mechanical fastener may be configured to couple the first annular body with the second annular body such that the first annular body and the second annular body define an axial gap therebetween.
MOUNTING ASSEMBLY FOR A BUNDLE OF A COMPRESSOR

[0001] This application claims the benefit of U.S. Provisional Patent Application having Ser. No. 62/139,045, which was filed Mar. 27, 2015. The aforementioned patent application is hereby incorporated by reference in its entirety into the present application to the extent consistent with the present application.

STATEMENT OF GOVERNMENT INTEREST

[0002] This invention was made with government support under Government Contract No. DOE-DE-FE0000493 awarded by the U.S. Department of Energy. The government has certain rights in the invention.

BACKGROUND

[0003] Compressors and systems incorporating compressors have been developed and are often utilized in a myriad of industrial processes (e.g., petroleum refineries, offshore oil production platforms, and subsea process control systems). Conventional compressors may be configured to compress a process fluid by applying kinetic energy to the process fluid to transport the process fluid from a low pressure environment to a high pressure environment. The compressed process fluid discharged from the compressors may be utilized to efficiently perform work or operate one or more downstream processes. Improvements in the efficiency of conventional compressors has increased the application of the compressors at various oil production sites: Many of the oil production sites (e.g., offshore), however, may be constrained or limited in space. Accordingly, there is an increased interest and demand for smaller and lighter compressors, or compact compressors. In addition to the foregoing, it is often desirable that the compact compressors be capable of achieving higher compression ratios (e.g., 10:1 or greater) for increased production while maintaining a compact footprint.

[0004] To achieve the higher compression ratios, conventional compact compressors may often utilize an impeller configured to rotate within a casing of the compact compressors to accelerate the process fluid. However, as the rotational speed of the impeller increases to the speed necessary to achieve the higher compression ratios (e.g., 10:1 or greater), thermal energy (e.g., heat of compression) generated in the compact compressors may also correspondingly increase. The increased thermal energy or heat generated in the compact compressors may often result in radial and/or axial expansion or growth of an internal assembly, or "bundle," of the compact compressors and/or components thereof. The radial and/or axial expansion of the internal assembly may ultimately result in damage to the compact compressors and/or components thereof. For example, the radial and/or axial expansion of the internal assembly may result in the exertion of excess forces (e.g., stress, strain, etc.) on the casing and the components of the internal assembly.

[0005] In view of the foregoing, conventional compact compressors may often be assembled or fabricated such that thermal gaps (e.g., radial and/or axial gaps) are formed between the components of the internal assembly. The thermal gaps allow the thermal expansion (e.g., the radial and/or axial expansion) of the internal assembly without the exertion or application of excess forces on the casing and the components of the internal assembly. While the thermal gaps allow the unencumbered thermal expansion of the internal assembly within the casing during one or more modes of operating the compact compressors, preserving or maintaining the thermal gaps during the assembly of the internal assembly and/or the insertion and removal of the internal assembly into the casing has proven to be increasingly difficult.

[0006] What is needed, then, is a mounting assembly for assembling an internal assembly of a compressor.

SUMMARY

[0007] Embodiments of the disclosure may provide a mounting assembly for assembling a bundle of a compressor. The mounting assembly may include a plurality of biasing members and a mechanical fastener. The plurality of biasing members may be disposed in a recess formed in a first annular body of the bundle, and may be configured to apply a biasing force to a second annular body of the bundle. The mechanical fastener may extend through a mounting flange of the second annular body and the plurality of biasing members. The mechanical fastener may be configured to couple the first annular body with the second annular body such that the first annular body and the second annular body define an axial gap therebetween.

[0008] Embodiments of the disclosure may also provide a compressor. The compressor may include an internal assembly and a casing configured to receive and at least partially support the internal assembly. The internal assembly may include a first annular body and a second annular body. The first annular body and the second annular body may define an axial gap therebetween, and may further define a fluid pathway of the compressor. The fluid pathway of the compressor may include an inlet passageway configured to receive a process fluid, an impeller cavity fluidly coupled with the inlet passageway, a diffuser fluidly coupled with the impeller cavity, and a volute fluidly coupled with the diffuser. The compressor may also include a mounting assembly configured to maintain the axial gap between the first annular body and the second annular body.

[0009] Embodiments of the disclosure may further provide a compressor having an internal assembly and a casing configured to receive and at least partially support the internal assembly. The internal assembly may include a first annular body and a second annular body. The first and second annular bodies may define an axial gap therebetween, and may further define a fluid pathway of the compressor. The fluid pathway may include an inlet passageway, an impeller cavity fluidly coupled with the inlet passageway, a diffuser fluidly coupled with the impeller cavity, and a volute fluidly coupled with the diffuser. The compressor may also include at least one mounting assembly configured to maintain the axial gap between the first and second annular body. The mounting assembly may include a plurality of biasing members and a mechanical fastener. The plurality of biasing members may be disposed in a recess formed in the first annular body. The plurality of biasing members may be configured to apply a biasing force to the second annular body. The mechanical fastener may extend through a mounting flange of the second annular body and the plurality of biasing members. The mechanical fastener may be coupled with the first annular body such that the first annular body and the second annular body define the axial gap therebetween.

BRIEF DESCRIPTION OF THE DRAWINGS

[0010] The present disclosure is best understood from the following detailed description when read with the accompa-
FIG. 1 illustrates a schematic view of an exemplary compression system including a compressor, according to one or more embodiments disclosed.

FIG. 2A illustrates a partial, cross-sectional view of an exemplary compressor that may be included in the compression system of FIG. 1, according to one or more embodiments disclosed.

FIG. 2B illustrates an enlarged view of the exemplary mounting assembly of FIG. 2A, according to one or more embodiments disclosed.

DETAILED DESCRIPTION

It is to be understood that the following disclosure describes several exemplary embodiments for implementing different features, structures, or functions of the invention. Exemplary embodiments of components, arrangements, and configurations are described below to simplify the present disclosure; however, these exemplary embodiments are provided merely as examples and are not intended to limit the scope of the invention. Additionally, the present disclosure may repeat reference numerals and/or letters in the various exemplary embodiments and across the Figures provided herein. This repetition is for the purpose of simplicity and clarity and does not in itself dictate a relationship between the various exemplary embodiments and/or configurations discussed in the various Figures. Moreover, the formation of a first feature over or on a second feature in the description that follows may include embodiments in which the first and second features are formed in direct contact, and may also include embodiments in which additional features may be formed interposing the first and second features, such that the first and second features may not be in direct contact. Finally, the exemplary embodiments presented below may be combined in any combination of ways, i.e., any element from one exemplary embodiment may be used in any other exemplary embodiment, without departing from the scope of the disclosure.

Additionally, certain terms are used throughout the following description and claims to refer to particular components. As one skilled in the art will appreciate, various entities may refer to the same component by different names, and as such, the naming convention for the elements described herein is not intended to limit the scope of the invention, unless otherwise specifically defined herein. Further, the naming convention used herein is not intended to distinguish between components that differ in name but not function. Further, in the following discussion and in the claims, the terms “including” and “comprising” are used in an open-ended fashion, and thus should be interpreted to mean “including, but not limited to.” All numerical values in this disclosure may be exact or approximate values unless otherwise specifically stated. Accordingly, various embodiments of the disclosure may deviate from the numbers, values, and ranges disclosed herein without departing from the intended scope. Furthermore, as it is used in the claims or specification, the term “or” is intended to encompass both exclusive and inclusive cases, i.e., “A or B” is intended to be synonymous with “at least one of A and B,” unless otherwise expressly specified herein.

The compressor 102 may be a direct-inlet centrifugal compressor. The direct-inlet centrifugal compressor may be, for example, a version of a Dresser-Rand Pipeline Direct Inlet (PDI) centrifugal compressor manufactured by the Dresser-Rand Company of Olean, N.Y. The compressor 102 may have a center-hung rotor configuration or an overhung rotor configuration, as illustrated in FIG. 1. In an exemplary embodiment, the compressor 102 may be an axial-inlet centrifugal compressor. In another embodiment, the compressor 102 may be a radial-inlet centrifugal compressor. As previously discussed, the compression system 100 may include one or more compressors 102. For example, the compression system 100 may include a plurality of compressors (not shown). In another example, illustrated in FIG. 1, the compression system 100 may include a single compressor 102. The compressor 102 may be a supersonic compressor or a subsonic compressor. In at least one embodiment, the compression system 100 may include a plurality of compressors (not shown), and at least one compressor of the plurality of compressors is a subsonic compressor. In another embodiment, illustrated in FIG. 1, the compression system 100 includes a single compressor 102, and the single compressor 102 is a supersonic compressor.

The compressor 102 may include one or more stages (not shown). In at least one embodiment, the compressor 102 may be a single-stage compressor. In another embodiment, the compressor 102 may be a multi-stage centrifugal compressor. Each stage (not shown) of the compressor 102 may be a subsonic compressor stage or a supersonic compressor stage. In an exemplary embodiment, the compressor 102 may include a single supersonic compressor stage. In another embodiment, the compressor 102 may include a plurality of
subsonic compressor stages. In yet another embodiment, the compressor 102 may include a subsonic compressor stage and a supersonic compressor stage. Any one or more stages of the compressor 102 may have a compression ratio greater than about 1:1. For example, any one or more stages of the compressor 102 may have a compression ratio of about 1:1.1, about 1:2.1, about 1:3.1, about 1:4.1, about 1:5.1, about 1:6.1, about 1:7.1, about 1:8.1, about 1:9.1, about 2:1, about 2:1.1, about 2:2.1, about 2:3.1, about 2:4.1, about 2:5.1, about 2:6.1, about 2:7.1, about 2:8.1, about 2:9.1, about 3:1, about 3:1.1, about 3:2, about 3:3.1, about 3:4.1, about 3:5.1, about 3:6.1, about 3:7.1, about 3:8.1, about 3:9.1, about 4:1, about 4:1.1, about 4:2.1, about 4:3.1, about 4:4.1, about 4:5.1, about 4:6.1, about 4:7.1, about 4:8.1, about 4:9.1, about 5:1, about 5:1.1, about 5:2.1, about 5:3.1, about 5:4.1, about 5:5.1, about 5:6.1, about 5:7.1, about 5:8.1, about 5:9.1, about 6:1, about 6:1.1, about 6:2, about 6:3.1, about 6:4.1, about 6:5.1, about 6:6.1, about 6:7.1, about 6:8.1, about 6:9.1, about 7:1, about 7:1.1, about 7:2, about 7:3.1, about 7:4.1, about 7:5.1, about 7:6.1, about 7:7, about 7:8.1, about 7:9.1, about 8:1, about 8:1.1, about 8:2, about 8:3.1, about 8:4.1, about 8:5.1, about 8:6.1, about 8:7.1, about 8:8.1, about 8:9.1, about 9:1, about 9:1.1, about 9:2, about 9:3.1, about 9:4.1, about 9:5.1, about 9:6.1, about 9:7.1, about 9:8.1, about 9:9.1, about 10:1, about 10:1.1, about 10:2, about 10:3.1, about 10:4.1, about 10:5.1, about 10:6.1, about 10:7.1, about 10:8, about 10:9.1, about 11:1, about 11:1.1, about 11:2.1, about 11:3.1, about 11:4.1, about 11:5.1, 11:3.6, about 11:7, about 11:8.1, about 11:9.1, about 12:1, about 12:1.1, about 12:2.1, about 12:3.1, about 12:4.1, about 12:5.1, about 12:6.1, about 12:7.1, about 12:8.1, about 12:9.1, about 13:1, about 13:1.1, about 13:2.1, about 13:3.1, about 13:4.1, about 13:5.1, about 13:6.1, about 13:7.1, about 13:8.1, about 13:9.1, about 14:1, or greater. In an exemplary embodiment, the compressor 102 may include a plurality of compressor stages, where a first stage (not shown) of the plurality of compressor stages may have a compression ratio of about 1:75:1 and a second stage (not shown) of the plurality of compressor stages may have a compression ratio of about 6:0.1.

[0019] The driver 104 may be configured to provide the drive shaft 106 with rotational energy. The drive shaft 106 may be integral or coupled with a rotary shaft 108 of the compressor 102 such that the rotational energy of the drive shaft 106 may be transmitted to the rotary shaft 108. The drive shaft 106 of the driver 104 may be coupled with the rotary shaft 108 via a gearbox (not shown) having a plurality of gears configured to transmit the rotational energy of the drive shaft 106 to the rotary shaft 108 of the compressor 102. Accordingly, the drive shaft 106 and the rotary shaft 108 may spin at the same speed, substantially similar speeds, or differing speeds and rotational directions via the gearbox. The driver 104 may be a motor, such as a permanent magnetic electric motor, and may include a stator (not shown) and a rotor (not shown). It should be appreciated, however, that other embodiments may employ other types of motors including, but not limited to, synchronous motors, induction motors, and brushed DC motors, or the like. The driver 104 may also be a hydraulic motor, an internal combustion engine, a steam turbine, a gas turbine, or any other device capable of driving or rotating the rotary shaft 108 of the compressor 102.

[0020] The compression system 100 may include one or more radial bearings 110 directly or indirectly supported by a housing 112 of the compression system 100. The radial bearings 110 may be configured to support the drive shaft 106 and/or the rotary shaft 108. The radial bearings 110 may be oil film bearings. The radial bearings 110 may also be magnetic bearings, such as active magnetic bearings, passive magnetic bearings, or the like. The compression system 100 may also include one or more axial thrust bearings 114 disposed adjacent the rotary shaft 108 and configured to control the axial movement of the rotary shaft 108. The axial thrust bearings 114 may be magnetic bearings configured to at least partially support and/or counter thrust loads or forces generated by the compressor 102.

[0021] The process fluid pressurized, circulated, contained, or otherwise utilized in the compression system 100 may be a fluid in a liquid phase, a gas phase, a supercritical state, a subsupercritical state, or any combination thereof. The process fluid may be a mixture, or process fluid mixture. The process fluid may include one or more high molecular weight process fluids, one or more low molecular weight process fluids, or any mixture or combination thereof. As used herein, the term “high molecular weight process fluids” refers to process fluids having a molecular weight of about 30 grams per mole (g/mol) or greater. Illustrative high molecular weight process fluids may include, but are not limited to, hydrocarbons, such as ethane, propane, butanes, pentanes, and hexanes. Illustrative low molecular weight process fluids may include, but are not limited to, carbon dioxide (CO2) or process fluid mixtures containing carbon dioxide. As used herein, the term “low molecular weight process fluids” refers to process fluids having a molecular weight less than about 30 g/mol. Illustrative low molecular weight process fluids may include, but are not limited to, air, hydrogen, methane, or any combination or mixtures thereof.

[0022] In an exemplary embodiment, the process fluid or the process fluid mixture may be or include carbon dioxide. The amount of carbon dioxide in the process fluid or the process fluid mixture may be at least about 85%, at least about 90%, at least about 95%, at least about 96%, at least about 97%, at least about 98%, or greater by volume. Utilizing carbon dioxide as the process fluid or as a component or part of the process fluid mixture in the compression system 100 may provide one or more advantages. For example, carbon dioxide may provide a readily available, inexpensive, non-toxic, and non-flammable process fluid. In another example, the relatively high working pressure of applications utilizing carbon dioxide may allow the compression system 100 incorporating carbon dioxide (e.g., as the process fluid or as part of the process fluid mixture) to be relatively more compact than compression systems incorporating other process fluids (e.g., process fluids not including carbon dioxide). Additionally, the high density and high heat capacity or volumetric heat capacity of carbon dioxide with respect to other process fluids may make carbon dioxide more “energy dense.” Accordingly, a relative size of the compression system 100 and/or the components thereof may be reduced without reducing the performance of the compression system 100.

[0023] The carbon dioxide may be of any particular type, source, purity, or grade. For example, industrial grade carbon dioxide may be utilized as the process fluid without departing from the scope of the disclosure. Further, as previously discussed, the process fluids may be a mixture, or process fluid mixture. The process fluid mixture may be selected for one or more desirable properties of the process fluid mixture within the compression system 100. For example, the process fluid mixture may include a mixture of a liquid absorbent and
carbon dioxide (or a process fluid containing carbon dioxide) that may enable the process fluid mixture to be compressed to a relatively higher pressure with less energy input than compressing carbon dioxide (or a process fluid containing carbon dioxide) alone.

[0024] FIG. 2A illustrates a partial, cross-sectional view of an exemplary compressor 200 that may be included in the compression system 100 of FIG. 1, according to one or more embodiments. FIG. 2B illustrates an enlarged view of a portion of the compressor 200 of FIG. 2A, according to one or more embodiments. As illustrated in FIG. 2A, the compression system 200 may include an internal assembly 202 and a casing 201 configured to receive and support the internal assembly 202. In an exemplary embodiment, the housing 112 (see FIG. 1) of the compression system 100 may also be configured to receive and support the internal assembly 202. An inner surface 204 of the casing 201 may define a cavity 206 at least partially extending between opposing axial ends (not shown) of the casing 201 and configured to receive the internal assembly 202.

[0025] The internal assembly 202 may include one or more annular bodies (three are shown 208, 210, 212). The annular bodies 208, 210, 212 may at least partially define a fluid pathway of the compressor 200 through which the process fluid may flow. The fluid pathway may include an inlet passageway 214 configured to receive the process fluid, an impeller cavity 216 fluidly coupled with the inlet passageway 214 and configured to receive an impeller 218, a diffuser 220 (e.g., annular diffuser passageway) fluidly coupled with the impeller cavity 216, and a collector or volute 222 fluidly coupled with the diffuser 220. The annular bodies 208, 210, 212 may be substantially aligned with one another along a longitudinal or rotational axis 224 of the compressor 200.

[0026] In one or more embodiments, the process fluid at a tip (not shown) of the impeller 218 may be subsonic and have an absolute Mach number less than one. For example, the process fluid at the tip of the impeller 218 may have an absolute Mach number less than 1, less than 0.9, less than 0.8, less than 0.7, less than 0.6, less than 0.5, less than 0.4, less than 0.3, less than 0.2, or less than 0.1. Accordingly, in such embodiments, the compressors 102, 200 discussed herein may be “subsonic,” as the impeller 218 may be configured to rotate about the longitudinal axis 228 at a speed sufficient to provide the process fluid at the tip thereof with an absolute Mach number of one or greater. In a supersonic compressor or a stage thereof, the rotational or tip speed of the impeller 218 may be about 500 meters per second (m/s) or greater. For example, the tip speed of the impeller 218 may be about 510 m/s, about 520 m/s, about 530 m/s, about 540 m/s, about 550 m/s, about 560 m/s, or greater.

[0027] In one or more embodiments, the process fluid at the tip of the impeller 218 may be supersonic and have an absolute Mach number of one or greater. For example, the process fluid at the tip of the impeller 218 may have an absolute Mach number of at least 1, at least 1.1, at least 1.2, at least 1.3, at least 1.4, or at least 1.5. Accordingly, in such embodiments, the compressors 102, 200 discussed herein are said to be “supersonic,” as the impeller 218 may be configured to rotate about the longitudinal axis 228 at a speed sufficient to provide the process fluid at the tip thereof with an absolute Mach number of one or greater or with a fluid velocity greater than the speed of sound. In a supersonic compressor or a stage thereof, the rotational or tip speed of the impeller 218 may be about 500 meters per second (m/s) or greater. For example, the tip speed of the impeller 218 may be about 510 m/s, about 520 m/s, about 530 m/s, about 540 m/s, about 550 m/s, about 560 m/s, or greater.

[0028] The annular bodies 208, 210, 212 may be coupled with one another to form at least a portion of the internal assembly 202. For example, as further described herein and illustrated in FIG. 2A, a first annular body 208 may be coupled with a second annular body 210, and the second annular body 210 may be coupled with a third annular body 212. Any two or more of the annular bodies 208, 210, 212 may be coupled with one another via one or more mounting assemblies (two are shown 226). For example, as illustrated in FIG. 2A and further illustrated in detail in FIG. 2B, the mounting assembly 226 may mount or couple the first annular body 208 (e.g., pressure head) with the second annular body 210 (e.g., volute portion). The mounting assembly 226 may be circumferentially spaced at substantially equal intervals about the first and second annular bodies 208, 210 of the internal assembly 202. It should be appreciated that each of the mounting assemblies 226 disclosed herein may include similar components and parts. Consequently, discussions herein regarding a single mounting assembly may be equally applicable to the remaining mounting assembly.

[0029] FIG. 2B illustrates the mounting assembly 226 in an extended position. In the extended position, opposing axial surfaces or faces 228, 230 of the first and second annular bodies 208, 210 may define an axial or thermal gap 232 therebetween. Similarly, opposing axial surfaces 234, 236 (see FIG. 2A) of the second and third annular bodies 210, 212 may also define an axial gap (not shown) therebetween. The axial gap 232 may be configured to allow the independent thermal expansion and/or contraction of each of the annular bodies 208, 210, 212 during one or more modes of operating the compressor 200. For example, during one or more modes of operating the compressor 200, one or more of the annular bodies 208, 210, 212 may absorb thermal energy or heat (e.g., heat of compression) and thereby exhibit or undergo transient thermal expansion. Accordingly, the axial gap 232 may allow each of the annular bodies 208, 210, 212 to freely expand without inducing additional pressure loads, forces, and/or mechanical stresses on the casing 201 of the compressor 200. As further described herein, the mounting assembly 226 may be configured to at least partially control or maintain an axial length of the axial gap 232 during assembly and/or disassembly of the compressor 200. It should be appreciated that in a contracted or seated position, the opposing axial surfaces 228, 230 of the first and second annular bodies 208, 210 may be urged toward or may contact one another. For example, in the seated position, the opposing axial surfaces 228, 230 may not define the axial gap 232 therebetween. In another example, in a partially seated position, the axial gap 232 may have a reduced axial length.

[0030] As illustrated in FIG. 2B, the mounting assembly 226 may include a mechanical fastener 238 configured to secure or couple the first and second annular bodies 208, 210 with one another. The mechanical fastener 238 may be or include, but is not limited to, a bolt, such as a threaded fastener or, as illustrated in FIG. 2B, a shoulder bolt. The shoulder bolt 238 may have a threaded portion 240, an unthreaded shoulder portion 242, and a head portion 244. As further illustrated in FIG. 2B, the second annular body 210 may have a mounting flange 246 defining one or more circumferentially-arrayed holes or perforations 248 (one is shown) extending therethrough and configured to receive at least a portion of the shoulder bolt 238. The shoulder bolt 238 may extend through the mounting flange 246 of the second annular body 210 via the perforation 248 and be coupled to the first annular body 208 via the threaded portion 240 thereof. The shoulder bolt 238 may extend through the per-
The biasing members 250 may exert the biasing force 252 to the mounting flange 246 directly or indirectly. For example, the biasing members 250 may directly engage the mounting flange 246 to apply the biasing force thereto. In another example, one or more spacers 256 (one is shown) may be disposed between the biasing members 250 and the mounting flange 246, and the biasing members 250 may indirectly engage the mounting flange 246 via the spacer 256. The spacer 256 may facilitate the alignment of the biasing members 250. The spacer 256 may also be configured to vary a preload applied to the biasing members 250 from the shoulder bolt 238. For example, a thickness of the spacer 256 may be increased or decreased to thereby increase or decrease the preload applied to the biasing members 250.

In an exemplary operation of the mounting assembly 226, with continued reference to FIGS. 2A and 2B, the biasing members 250 (e.g., Belleville washers) and the spacer 256 may be disposed in the counterbored hole 254 of the first annular body 208 such that the spacer 256 engages the mounting flange 246 of the second annular body 210. The shoulder bolt 238 may extend through the perforation 248 such that the mounting flange 246, the spacer 256, and the biasing members 250 may be slidably disposed along the shoulder portion 242 of the shoulder bolt 238. The shoulder bolt 238 may be at least partially threaded into the first annular body 208 to a predetermined depth of at least partially define the axial length of the axial gap 232. The shoulder bolt 238 may also be threaded into the first annular body 208 to couple the first and second annular bodies 208, 210 with one another to at least partially assemble the internal assembly 202.

It should be appreciated that the mounting assembly 226 described herein may be configured to couple the first and second annular bodies 208, 210 of the internal assembly 202 with one another to thereby form a unitized internal assembly. In addition to coupling the first and second annular bodies 208, 210 with one another, the mounting assembly 226 may maintain the axial or thermal gap 232 between the first and second annular bodies 208, 210. Unitizing the annular bodies 208, 210 of the internal assembly 202 and maintaining the axial gaps 232 between the annular bodies 208, 210 via the mounting assembly 226 may facilitate the assembly of the compressor 200. For example, utilizing the mounting assembly 226 may facilitate the assembly of the compressor 200 by allowing the internal assembly 202 to be inserted into and/or removed from the casing 201 of the compressor 200 as a unitized or single assembly. The mounting assembly 226 may also be configured to allow the thermal expansion and/or contraction of each of the annular bodies 208, 210, 212 during one or more modes of operating the compressor 200. The mounting assembly 226 may further be configured to maintain concentricity and/or alignment between the annular bodies 208, 210, 212. The mounting assembly 226 may also be configured to properly position or locate the axial gap 232 and/or the internal assembly 202. The mounting assembly 226 may also be configured to preload one or more internal seals (e.g., metal seals) disposed between the annular bodies 208, 210 of the internal assembly 202.

The foregoing has outlined features of several embodiments so that those skilled in the art may better understand the present disclosure. Those skilled in the art should appreciate that they may readily use the present disclosure as a basis for designing or modifying other processes and structures for carrying out the same purposes and/or achieving the same advantages of the embodiments introduced herein.
Those skilled in the art should also realize that such equivalent constructions do not depart from the spirit and scope of the present disclosure, and that they may make various changes, substitutions, and alterations herein without departing from the spirit and scope of the present disclosure.

We claim:
1. A mounting assembly for assembling a bundle of a compressor, comprising:
   a plurality of biasing members disposed in a recess formed in a first annular body of the bundle and configured to apply a biasing force to a second annular body of the bundle;
   and
   a mechanical fastener extending through a mounting flange of the second annular body and the plurality of biasing members, the mechanical fastener configured to couple the first annular body with the second annular body such that the first annular body and the second annular body define an axial gap therebetween.
2. The mounting assembly of claim 1, wherein a first biasing member and a second biasing member of the plurality of biasing members are oriented in opposing axial directions.
3. The mounting assembly of claim 1, wherein a first biasing member and a second biasing member of the plurality of biasing members are oriented in a first axial direction.
4. The mounting assembly of claim 1, wherein at least one biasing member of the plurality of biasing members is a Belleville washer.
5. The mounting assembly of claim 1, further comprising a spacer at least partially disposed in the recess between the plurality of biasing members and the mounting flange of the second annular body, and wherein the plurality of biasing members is configured to apply the biasing force to the mounting flange of the second annular body via the spacer.
6. The mounting assembly of claim 1, wherein the mounting flange defines a perforation extending therethrough, and the mechanical fastener extends through the perforation such that the mounting flange is slidable disposed along at least a portion of the mechanical fastener.
7. The mounting assembly of claim 6, wherein the mechanical fastener comprises:
   a threaded portion configured to couple the mechanical fastener with the first annular body;
   a shoulder portion extending through the perforation such that the mounting flange is slidable disposed along the shoulder portion; and
   a head portion configured to engage the mounting flange.
8. A compressor, comprising:
   an internal assembly comprising a first annular body and a second annular body, the first annular body and the second annular body defining an axial gap therebetween and further defining a fluid pathway of the compressor, the fluid pathway comprising:
   an inlet passageway configured to receive a process fluid;
   an impeller cavity fluidly coupled with the inlet passageway;
   a diffuser fluidly coupled with the impeller cavity; and
   a volute fluidly coupled with the diffuser;
   a casing configured to receive and at least partially support the internal assembly; and
   a mounting assembly configured to maintain the axial gap between the first annular body and the second annular body.
9. The compressor of claim 8, further comprising:
   a rotary shaft disposed in the casing; and
   an impeller disposed in the impeller cavity and coupled with the rotary shaft.
10. The compressor of claim 9, wherein the impeller is configured to receive the process fluid from the inlet passageway and discharge the process fluid to the diffuser at an absolute Mach number of about 1.3 or greater.
11. The compressor of claim 10, wherein the compressor is configured to provide a compression ratio of at least about 10:1.
12. The compressor of claim 11, wherein the mounting assembly comprises:
   a plurality of biasing members disposed in a recess formed in the first annular body and configured to apply a biasing force to the second annular body; and
   a shoulder bolt coupled with the first annular body and extending through a mounting flange of the second annular body and the plurality of biasing members, the shoulder bolt configured to at least partially maintain the axial gap between the first annular body and the second annular body.
13. The compressor of claim 12, wherein a first biasing member of the plurality of biasing members is oriented in a first axial direction, and a second biasing member of the plurality of biasing members is oriented in a second axial direction opposite the first axial direction.
14. The compressor of claim 12, wherein a first biasing member and a second biasing member of the plurality of biasing members are oriented in a first axial direction.
15. The compressor of claim 12, wherein at least one biasing member of the plurality of biasing members is a Belleville washer.
16. The compressor of claim 12, further comprising a spacer at least partially disposed in the recess between the plurality of biasing members and the mounting flange of the second annular body.
17. The compressor of claim 12, wherein the shoulder bolt comprises:
   a threaded portion configured to couple the shoulder bolt with the first annular body;
   a shoulder portion configured to extend through the mounting flange such that the mounting flange is slidable disposed along the shoulder portion; and
   a head portion configured to engage the mounting flange.
18. A compressor, comprising:
   an internal assembly comprising a first annular body and a second annular body, the first annular body and the second annular body defining an axial gap therebetween and further defining a fluid pathway of the compressor, the fluid pathway comprising:
   an inlet passageway;
   an impeller cavity fluidly coupled with the inlet passageway;
   a diffuser fluidly coupled with the impeller cavity; and
   a volute fluidly coupled with the diffuser;
   a casing configured to receive and at least partially support the internal assembly; and
   at least one mounting assembly configured to maintain the axial gap between the first annular body and the second annular body, the mounting assembly comprising:
a plurality of biasing members disposed in a recess formed in the first annular body and configured to apply a biasing force to the second annular body; and a mechanical fastener extending through a mounting flange of the second annular body and the plurality of biasing members, the mechanical fastener coupled with the first annular body such that the first annular body and the second annular body define the axial gap therebetween.

19. The compressor of claim 18, wherein the inlet passageway is configured to receive a process fluid comprising carbon dioxide.

20. The compressor of claim 19, further comprising: a rotary shaft disposed in the casing; and an impeller disposed in the impeller cavity and coupled with the rotary shaft, the impeller configured to receive the process fluid from the inlet passageway and discharge the process fluid to the diffuser at an absolute Mach number of about 1.3 or greater, wherein the compressor is configured to provide a compression ratio of at least about 10:1.