

March 26, 1968

K. G. CIVENKA
ROTARY GAS COMPRESSOR

3,374,943

Filed Aug. 15, 1966

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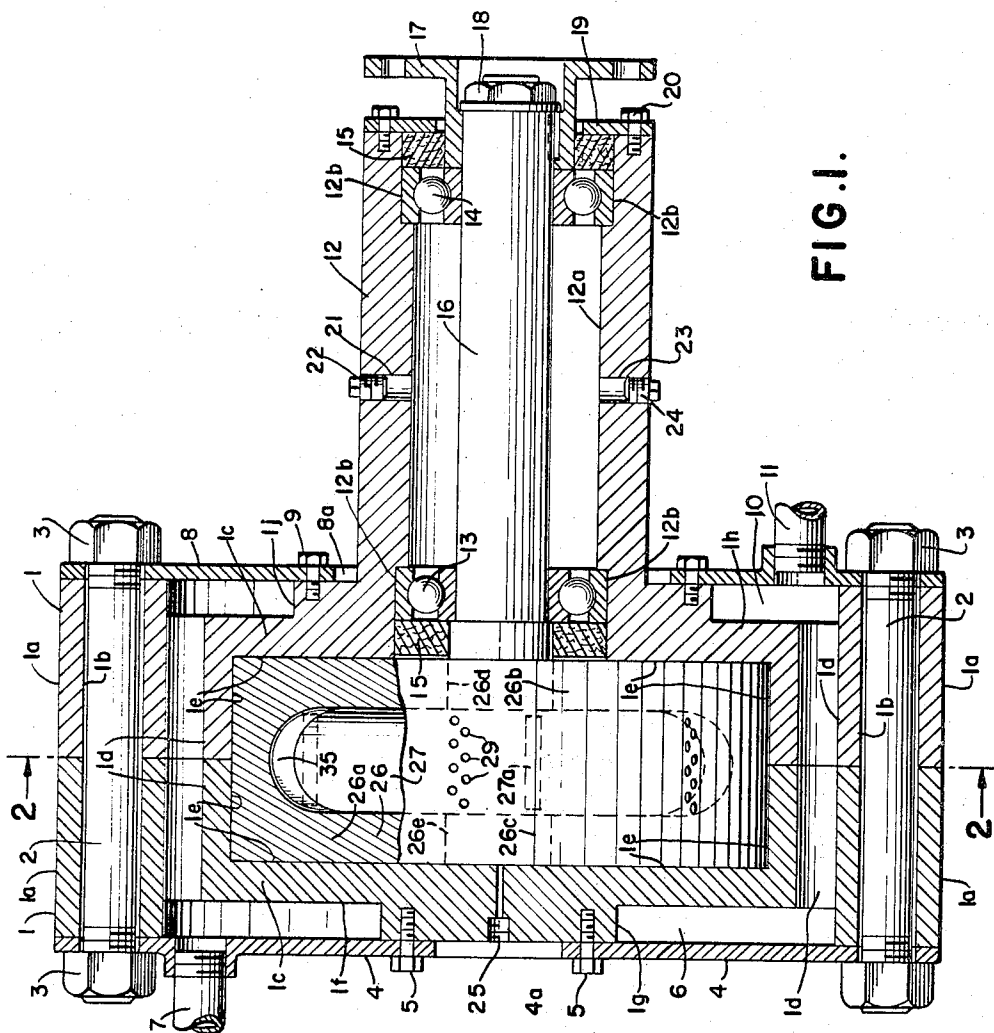


FIG. 1.

INVENTOR

Kenneth Civenka

BY

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ATTORNEY

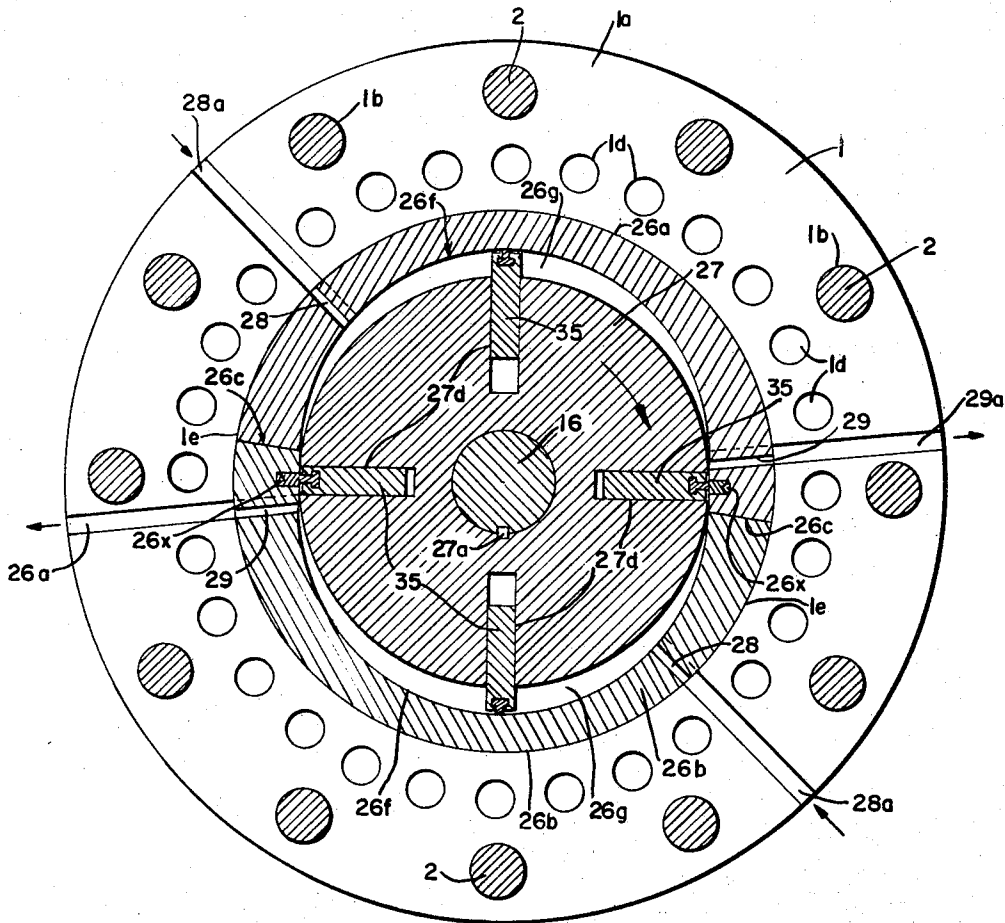
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BY

INVENTOR
Kenneth Cervenka

Kenneth Cervenka

ATTORNEY

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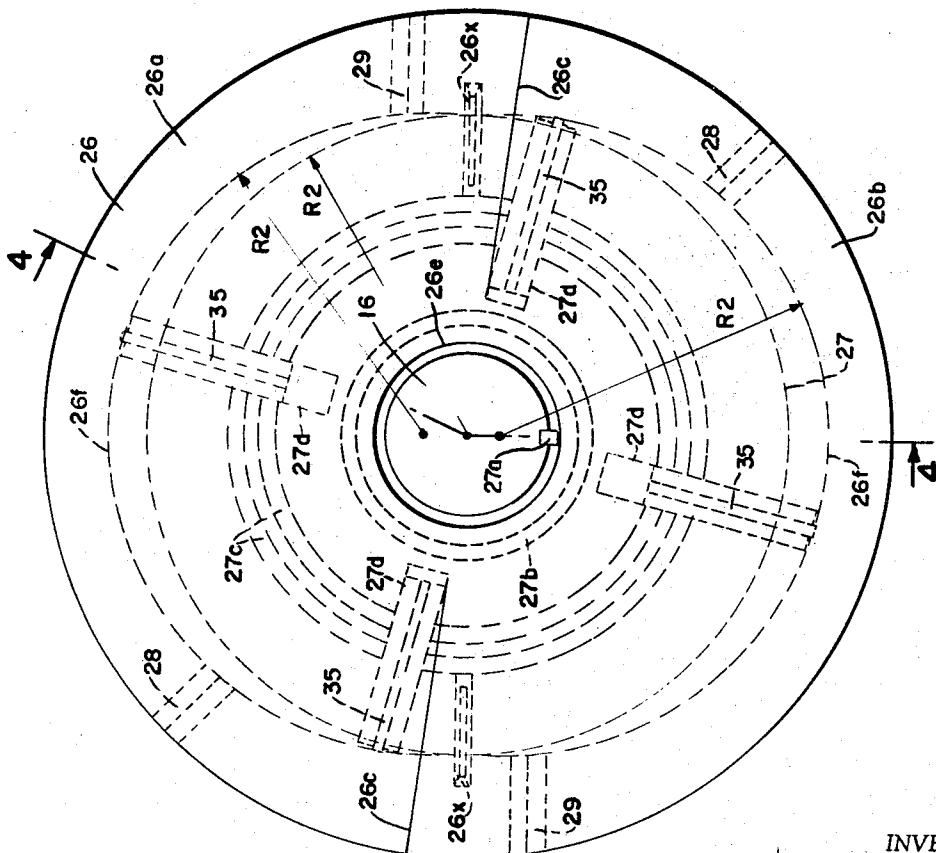
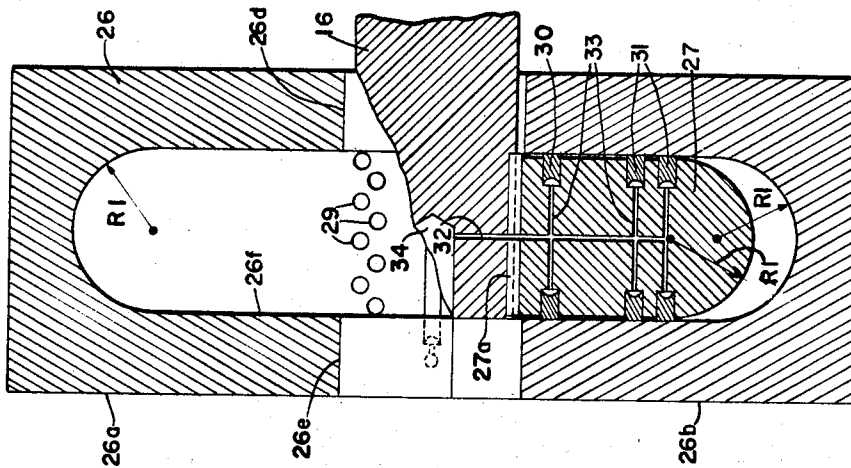
K. G. CERVENKA

3,374,943

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4 Sheets-Sheet 3



INVENTOR

Kenneth Cervenka

BY

Alexander M. Darr

ATTORNEYS

March 26, 1968

K. G. CERVENKA
ROTARY GAS COMPRESSOR

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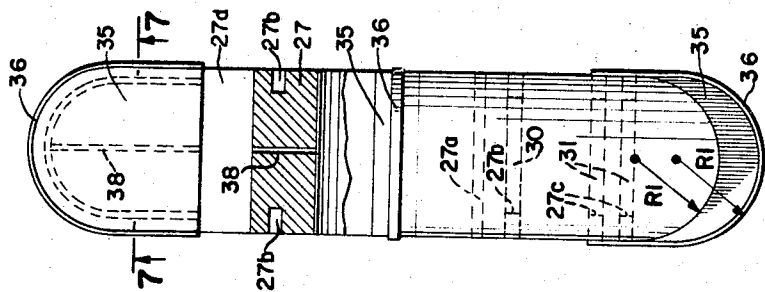


FIG. 6.

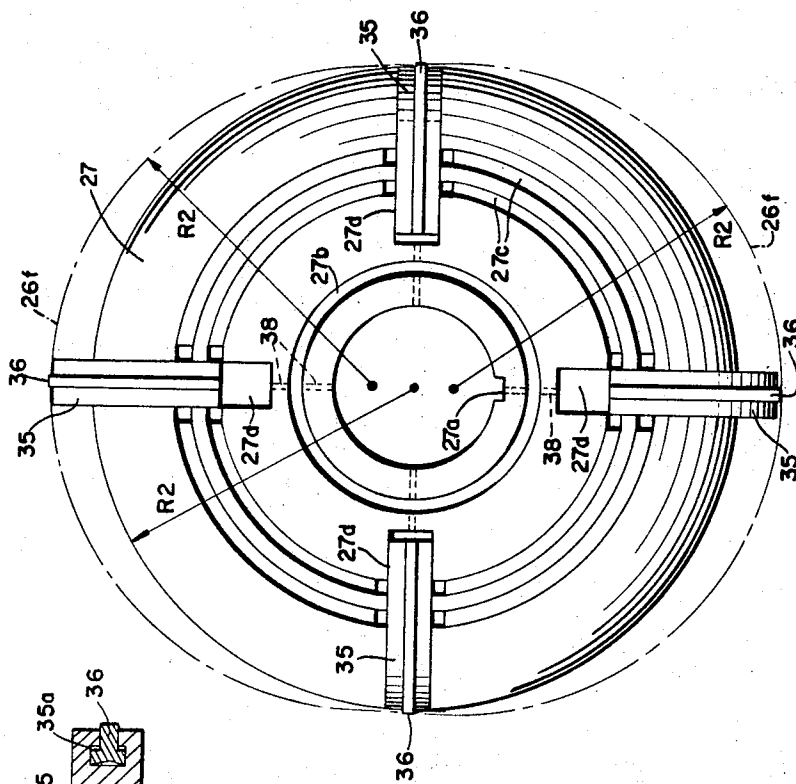


FIG. 5.

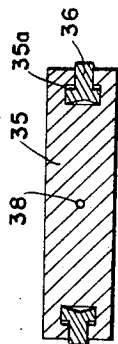


FIG. 7.

INVENTOR

Kenneth Cervenka

BY

Handwritten signature of Kenneth Cervenka

ATTORNEY

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3,374,943

ROTARY GAS COMPRESSOR

Kenneth G. Cervenka, 204 N. Dewberry,
Midland, Tex. 79701Filed Aug. 15, 1966, Ser. No. 572,534
15 Claims. (Cl. 230-152)

My invention is a novel rotary gas compressor particularly adapted for natural gas, and suitable for field installation in gas wells having pressures insufficient to directly enter transmission lines, the compressor being defined as a high speed rotary type with free pistons, actuated by gas discharge pressure, the free pistons operating in two bi-center, semi-torous shaped compression chambers, and being propelled by a rotor attached to the input power shaft which in turn is coupled directly to a prime mover. In my compressor the gas capacities will range in accordance to the size of the compressor, the intake suction pressure of the gas, and the r.p.m. of the compressor rotor. The design, materials, and pressure ratings of my compressor are based on its use in high pressure gas compression service with discharge pressures approximating 1000 p.s.i., all component parts having this intrinsic pressure rating.

The primary requisite of a compressor for this type of high pressure service is the provision of a compressor chamber that will be self-sealing and will hold high pressure with a minimum of bypassing of gas. The two semi-torus shaped compression chambers (semi-circular in cross-section) of my compressor are designed exclusively for this use and differ from all previous compression chambers which are rectangular in cross-section. Thus the distinguishing features of my compressor, in brief, are as follows: (1) The semi-torus shaped compression chambers. (2) The use of free pistons with pressure actuated seals which are wear-compensating. (3) The use of rotor seals which are pressure actuated, wear-compensating and are constructed of material with an extremely low coefficient of friction, preferably Teflon impregnated with graphite. (4) The feature of water (liquid) cooling of the entire compressor.

In accordance with the above, the principal object of my invention is to provide a compressor of the above type having the following major components:

(A) An outer housing comprising a steel machined case to hold the inner compression case, and bored for water cooling, and having a machined neck to serve as a bearing carrier for the power input shaft;

(B) End plates comprising machined steel plates bolted to the outer housing to form sealed watertight chambers for water-cooling the compressor parts;

(C) An inner compression housing comprising a steel, machine, externally circular and split casing which is internally machined for receiving the double bi-center semi-torus ring compression chambers, and is bored with two sets each of discharge gas ports and suction gas ports positioned for maximum performance;

(D) A rotor comprising a flat cylindrical steel carrier for the free pistons, and having a radius of R_2 ; the outer edge of which is machined with a radius R_1 equal to the matching inner radius R_1 of the semi-torus compressional chambers in which it operates, and with the ratio of R_2 to R_1 being 4 to 1; the rotor having holes bored therein to the free piston slots, and compression seal grooves through which actuating gas can reach the seals and pistons;

(E) A power input shaft which is attached at one end to the rotor, the other end being attached by a universal joint to a prime mover, the shaft being supported by two sets of thrust ball bearings positioned in the outer housing;

(F) The free pistons comprising four shaped vanes located at 90° intervals in the rotor and having their outer

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surfaces machined with a radius R_1 to conform to that of the compression chambers, each piston having one pressure actuated and wear-compensating seal seated in a machined retaining groove;

(G) The seals which are of circular type made from Teflon impregnated with graphite and so shaped in cross-section as to expand and seal off the actuating pressure gas which in turn expands them, and which are of sufficient depth to be wear-compensating.

I will explain the invention with reference to the accompanying drawings which illustrate one practical embodiment thereof, to enable others familiar with the art to adopt and use the same; and will summarize in the claims the novel features of construction, and novel combinations of parts, for which protection is desired.

In said drawings:

FIG. 1 is a transverse vertical section through the compressor on the axis of the power input shaft.

FIG. 2 is a vertical section on the line 2-2, FIG. 1.

FIG. 3 is an enlarged side elevation of the bi-center, semi-torus compression chamber indicating in dotted lines the free piston rotor therein and the pressure actuated compensating seal system therein.

FIG. 4 is a transverse section on the line 4-4, FIG. 3.

FIG. 5 is an elevational view of the rotor, detached, showing the arrangement of free pistons and the seals.

FIG. 6 is a side elevation, partly in section, of the parts shown in FIG. 5.

FIG. 7 is an enlarged section on the line 7-7, FIG. 6.

As shown in FIGS. 1 and 2, my novel compressor comprises an outer casing of machined steel adapted to hold the inner compression casing, the outer casing being designed for water cooling and provided with a machined neck to serve as a bearing carrier for the power input shaft. The outer casing comprises two substantially complementary circular casings 1 of substantial width having abutting peripheral flange portions 1a provided with series of registering bores 1b for the reception of bolts 2 which clamp the sections together side-by-side to form a substantially circular outer casing, the bolts 2 extending through the bores 1b and being provided at each end with nuts 3 as clearly shown.

Each section 1 is provided with a web portion 1c intermediate the width of its respective peripheral flange 1a; and extending through the outer portions of the webs 1c are registering bores 1d for the purpose hereinafter described.

In the inner faces of the webs 1c are complementary circular recesses 1e disposed inwardly of the annular series of bores 1d, the complementary bores 1e when the casing is assembled forming a housing to receive an inner compression chamber 26 of cylindrical shape as shown in FIGS. 1 and 2 for the purpose hereinafter described.

The outer face of one web 1c of one member 1 is recessed as at 1f leaving a circular hub portion 1g at the center of the web, while the outer face of the web 1c of the other member 1 is recessed as at 1h, leaving a circular hub 1j at the center of that web, the outer faces of the hubs 1g and 1j being flush with the outer faces of the peripheral flange portions 1a of the members 1, as shown in FIG. 1.

Bolted across the ends of the hub 1g and the adjacent peripheral flange 1a is an end plate 4 of same diameter as the peripheral flange 1a, the end plate 4 having a peripheral series of holes therein through which the bolts 2 also pass, thereby clamping the periphery of the end plate 4 to the peripheral flange 1a in a water tight manner. The center of the plate 4 is provided with a circular opening 4a and around the opening 4a is a circular series of holes receiving bolts 5 or the like to secure the central portion of the plate 4 to the outer face of the tube 1g in a watertight manner, thereby forming a water cooling

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chamber or jacket 6 registering with the bores 1d in the members 1, a cooling water outlet 7 being tapped into the plate 4 opposite the bores 1d. At the center of the hub 1g on the axis of the shaft 16 is an actuating gas inlet connection and bore 25 for the purpose hereinafter described.

At the opposite side of the outer casing 1—1 is an end plate 8 having a peripheral series of holes for the passage of the bolts 2 to lock the periphery thereof to the adjacent end of the peripheral flange 1a in a watertight manner. The center of the plate 8 is provided with a circular hole 8a, and with a circular series of holes adjacent the opening 8a for the passage of bolts 9 or the like which clamp the central portion of the plate 8 to the outer face of the hub 1j in a watertight manner, as clearly shown in FIG. 1. The space between the plate 8 and the web 1c forms a water cooling chamber of jacket 10 similar to the jacket 6 communicating or registering with the holes 1d of the peripheral flanges 1a, plate 8 being provided opposite the registering holes 1d with a cooling water inlet 11 connected with a suitable source of cooling water under pressure which enters the inlet 11, circulates continuously through the jacket 10, through the registering holes 1d, and into the water jacket 6 and out through the outlet pipe 7 for the purpose of dissipating heat generated within the inner compression chamber 26.

On the axis of the inner compression chamber formed by the circular recesses 1e is a tubular bearing carrier 12 (FIG. 1) formed integrally with the adjacent web 1c of the outer casing, said carrier 12 extending through the circular hole 8a of the plate 8, the carrier 12 having a central bore 12a provided adjacent each end with enlarged bores 12b for the reception of thrust-absorbing ball bearings 13 and 14 respectively provided with self-sealing oil seals 15 adjacent the outer faces of the ball bearings 13, 14, engaging a power intake shaft 16, FIG. 1, which rotates the compressor rotor 27, shaft 16 having a universal flange 17 keyed to its outer end beyond the outer end of the bearing carrier 12 and secured by a retaining nut 18 to the end of shaft 16. A retaining cap 19 is secured by bolts 20 to the outer end of the bearing carrier 12 around the shaft 16 and engages the outer face of the outer seal 15, as shown in FIG. 1. In the top of the bearing carrier 12 between the ball bearings 13 and 14 is a filling hole 21 normally closed by a plug 22 whereby lubricating oil may be admitted into the bearing carrier to lubricate the bearings 13 and 14, and in the lower portion of the bearing carrier is a drain opening 23 normally closed by a plug 24, whereby the lubricating oil within the bearing carrier may be drained when desired.

Within the circular cylindrical chamber formed by the recesses 1e of the webs 1c of the outer casing is a cylindrical inner compression case 26 formed of steel which is machined externally circular, and also internally machined to provide double bi-center semi-torus ring compression chambers, the same being bored with two sets each of discharge gas ports and suction gas ports positioned for maximum performance. As shown, the inner compression case 26 is formed of an upper half 26a and a lower half 26b, as shown in FIG. 3, the halves being separable on a diametrical split 26c which passes through the center of the case 26, but the plane of the split is disposed at a slight angle to the horizontal axis of the case 26, as shown more particularly in FIG. 3, for the purpose hereinafter described. The center of the case 26 at the side adjacent the bearing carrier 12 has a hole 26d for the reception of the rotor shaft 16, while the opposite side of the case has a central opening 26e registering with the actuating gas inlet port 25 (FIG. 1) for the purpose hereinafter described.

Within the upper and lower members 26a and 26b is a double bi-center semi-torus ring compression chamber 26f formed in the two halves 26a and 26b, the compression chamber 26f being non-cylindrical, as shown more particularly in FIGS. 2 and 3, but adapted to receive the

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cylindrical rotor 27 hereinafter described. As shown in FIG. 2, the walls of the chamber 26f on the horizontal axis of the compressor are spaced apart an amount slightly greater than the diameter of the rotor 27 so that the sides of the rotor 27 on the horizontal axis of the compressor make a running fit thereagainst. As shown in FIG. 3, the radius of the rotor 27 is equal to R_2 , and the rounded periphery of the rotor 27 is formed on a radius R_1 (FIG. 4). Thus the side walls of the chamber 26f are spaced apart a distance equal to twice the radius R_1 . The wall of the recess 26f in the upper half 26a and the wall of the recess 26f in the lower half 26b are formed on the same radius R_2 , hereinbefore mentioned, but the axes of the radii are disposed equal distances above and below the axis of the shaft 16 respectively, as shown in FIG. 3, thus leaving compression chambers 26g (FIG. 2) of crescent shape between the top and bottom of the rotor 27 and the top and bottom of the compression chamber 26f disposed 180° apart as indicated in FIG. 2. In addition, the entire periphery of the compression chamber 26f, throughout, is machined to the before-mentioned radius R_1 , FIG. 4, thereby forming a double bi-center semi-torus ring compression chamber 26f housing the rotor 27 and forming a pair of semi-torus suction and compression chambers 26g positioned 180° apart, as shown in FIGS. 2 and 3.

In the wall of the compression case 26 are a pair of gas suction ports 28 positioned as shown in FIG. 2; also a pair of gas discharge ports 29, the discharge ports 29 registering with discharge ports 29a in the outer casing 1 and the suction ports 28 registering with suction ports 28a in the outer casing 1. As shown, the suction gas inlet and discharge ports 28 and 29 are positioned for maximum performance, the ports 29 being disposed closely adjacent to but spaced from the horizontal axis of the rotor 27 and the suction ports 28 being positioned as shown in FIG. 2 for maximum performance.

Within the compression chamber 26 is the rotor 27 comprising a flat cylindrical steel cylinder carrying the free vanes or pistons, said cylinder having a radius equal to R_2 , the periphery of which is machined to the radius R_1 , the radii R_2 and R_1 matching those of the semi-torus compression chamber 26f in which it operates, and the ratio of R_2 and R_1 preferably being 4 to 1. As shown in FIG. 4, the width of the cylinder 27 is such as to make a close running fit within the side walls of the recess 26f, the cylinder 27 being keyed as at 27a to the power input shaft 16 so as to rotate therewith.

In order to positively separate the upper and lower compression chambers 26g, FIG. 2, I provide in the side walls of the chamber 26f on the horizontal axis of the shaft 16 seals 26x, FIG. 2, set in slots provided therefor, said seals being preferably of Teflon or the like, the outer edges of which directly engage at all times the periphery of the rotor 27 to prevent passage of gases from one compression chamber 26g to the other during rotation of the rotor 27. Also, in order to prevent leakage of gases or the like along the contacting faces of the sides of the rotor 27 and the walls 26f of the chamber 26, I provide seals of circular type made of Teflon impregnated with graphite and so shaped in cross-section that they may expand and seal off actuating pressure gas which in turn expands them, the seals being of sufficient depth to be wear-compensating.

In FIGS. 3, 4, 5 and 6 an annular groove 27b is provided in each side of the rotor 27 adjacent the shaft 16 adapted to receive a circular sealing ring 30, FIG. 4; and adjacent the outer periphery of the rotor 27 in each side thereof is a pair of spaced annular grooves 27c adapted to receive circular sealing rings 31 respectively, the outer ends of the seals normally engaging the wall 26f of the chamber 26 as shown in FIG. 4. In order to force the seals 30, 31 outwardly of their respective grooves 27b, 27c, into firm contact with the wall 26f

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of the chamber 26, I provide in the rotor 27 a radial bore 32, FIG. 4, connected by branch bores 33 with the bases of the circular grooves 27b and 27c respectively, the bore 32 extending inwardly to an activating gas port 34 in the end of the shaft 16 registering with the gas inlet port 8, whereby the activating gases under pressure from the inlet 8 may pass into the bores 32 and 33 and force the compression seals 30 and 31 outwardly of their respective slots 27b and 27c.

In the rotor 27 are four radial slots 27d (FIGS. 2, 3, 5 and 6) for the reception of slidable vanes 35 which are adapted to slide in and out of their respective slots 27d as the rotor 27 rotates to maintain the outer periphery of the vanes 35 in contact with the wall 26f of the chamber 26. As shown in FIG. 6, each of the vanes 35 at its outer edge is formed on the same radius R_1 as the outer periphery of the rotor 27 so that the vanes will snugly engage the radial peripheral wall of the chamber 26f of the member 26, as shown in FIGS. 1 and 6. At the outer edge of each vane 35 is a seal 36 shown more particularly in FIGS. 6 and 7, the seal 36 being T-shaped as shown in FIG. 7 and fitting within a correspondingly shaped T-slot 35a in the sides and outer end of each vane 35, the seal being preferably formed of Teflon impregnated with graphite and so shaped in cross-section as to expand and seal off actuating pressure gas which in turn expands them, the seals being of sufficient depth to be wear-compensating. The four vanes 35 are located at 90° intervals around the rotor 27 and have their outer faces machined to the same radius R_1 so as to conform to the shape of the periphery of the compression chambers, each vane having one pressure actuating and wear-compensating seal 36 disposed in a retaining groove.

As shown, each of the vanes 35 are of less depth than the slots 27d, and in order to pressurize the vanes 35 for purpose of forcing same radially outwardly, I provide a radial duct 38, FIGS. 5 and 6, extending from the base of each slot 27d into the central bore in the rotor 27 for the shaft 16 so that activating gases from the inlet 8 may extend through the bores 8, 26e and 34 to the underside of the vanes 35, whereby the vanes will be urged outwardly into engagement with the walls 26f of the chamber 26, as indicated in FIGS. 2, 3, 5 and 6.

By the above described construction I provide a compressor of the above type described in which natural gas is piped to the compressor and enters the compressor through suitable manifolding at the two intake ports 28-28a located 180° apart. The suction ports 28-28a are so located in relation to the geometric center of the rotor 27 containing the pistons 35 that the maximum amount of gas possible is trapped between two adjacent pistons 35 as rotational energy is supplied to the rotor 27. Upon further rotation the suction ports 28-28a begin discharging into the next rotor quadrant while the first mentioned pistons 35 rotate in compression and discharge positions and finally into seal-off position. The compressed gas has been discharged from the compressor through the discharge ports 29-29a. By utilizing four free pistons 35, two compression chambers 26g located 180° apart from each other, and two sets of discharge ports 29-29a, suction ports 28-28a, and discharge seals 26x, a total of eight compressive and discharge cycles are completed for each revolution of the rotor 27. The free pistons 35 maintain sealing contact with the walls 26f of the compression chambers 26g by the force exerted by the actuating gas from inlet port 8 on the bases of the pistons 35 and by the centrifugal force acting on the pistons as the rotor is rotated at an approximate speed of 1000 r.p.m.

The circular compression chamber seals 30, 31 and the semi-circular discharge seals 36 maintain a seal on the rotor 27 and pistons 35 by the force of the actuating gas exerted at their back or expansion sides. Actuating gas for said seals is brought into the compressor at inlet 8 by an external pipe line from a discharge tank (bottle) at discharge pressure, into the inlet 8 in the body of the com-

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pressor, however, a regulator assembly (not shown) between the tank and compressor would permit the pressure variation needed for most efficient operation. Oiling to the seals and pistons may be provided by a hydraulic cylinder (not shown) with discharge pressure gas exerting force on a hydraulic piston which in turn forces the lubricating oil under greater pressure than the internal suction area portions of the compressor where the oil entry lines are located.

The outstanding features of my invention, therefore, are a rotary type of gas compressor having two balanced compression chambers each shaped as the outer half of a torus ring, the chambers having a circular radius of R_2 equal to the radius R_2 of the rotor, the centers of the torus rings being equally distant from the center of the rotor or compressor on a common line and passing through the center of the machine. The design of the compression chambers and the rotor is such that the rotor becomes completely tangent to it at only two places, and these two places of tangency become discharge seals for the compression chambers. The employment of a semi-torus chamber results in the lowest possible acceleration and deceleration for the free pistons which are shaped to fit the semi-torus chambers. My design and shape of the free pistons has the inherent feature of maximum load torque at the rotor and minimum load torque at the outer perimeters. The four free pistons are located 90° apart in the rotor which provide for dynamic balancing, and eliminate the need of suction and discharged valves. The free pistons and their Teflon-graphite seal rings are both pressure actuated by gas pressure and the seal rings are so constructed as to be wear-compensating.

The circular type of seal rings located in the rotor and sealing against the compression chamber are constructed of Teflon impregnated with graphite and so constructed that when actuated by discharge gas pressure become both seal-sealing and wear-compensating. The use of Teflon-graphite seals cuts frictional losses to a minimum due to the extremely low coefficient of friction of the material.

The incorporation of a gas pressure regulator between the source at the gas tank and the compressor body allows for selecting the optimum pressure for the most economic operation of the seals and free pistons.

The outer housing is bored with a maximum density of water courses for water circulation to permit rapid dissipation of the heat of compression, and allows the compressor to operate in the optimum temperature range. The outer housing holds the two thrust absorbing ball bearings that carry the rotor shaft. This bearing chamber is sealed at both ends and contains its own oil reservoir for long life and trouble-free maintenance.

I do not limit my invention to the exact form shown in the drawings, for obviously changes may be made therein within the scope of the claims.

I claim:

1. A rotary gas compressor comprising an outer casing having a cylindrical recess therein; a bearing carrier on said casing disposed axially of said recess; an input shaft journaled in said carrier and extending into said recess; a cylindrical inner compression casing within said recess and having an axial hole for said shaft, and having a non-cylindrical double bi-center semi-torus ring compression chamber therein provided with two sets of suction gas ports and discharge gas ports; a cylindrical rotor within said compression chamber keyed to said shaft and of width conforming with that of the compression chamber, the periphery of the rotor and the peripheral wall of the compression chamber being rounded on the same radius whereby the rotor is tangent to the walls of the compression chamber at points on the horizontal axis of the shaft thereby leaving crescent-shaped compression spaces between the upper and lower portions of the rotor and the top and bottom portions of the compression chamber disposed 180° apart into which the discharge ports and

suction ports extend; said rotor having four radial slots spaced 90° apart; slidable vanes in said slots having peripheries rounded on the same radius as the peripheral walls of the rotor and compression chamber, and means for cooling the outer casing and inner compression chamber carried thereby.

2. In a compressor as set forth in claim 1, said outer casing being formed of complementary sections secured together side-by-side, each section comprising a circular member having a peripheral flange; each section having a web intermediate the width of its flange provided with bores adjacent to its periphery registering with the bores of the other section when assembled; and each web having a cylindrical recess in its inner face disposed inwardly of the circular series of bores, said recesses together forming a chamber when the sections are assembled receiving the inner compression casing.

3. In a compressor as set forth in claim 2; said bearing carrier being integral with one section and comprising a tubular extension on the axis of the compression casing housing said shaft; ball bearings adjacent the ends of the extension engaging the shaft; oil seals in said extension at the outer sides of the ball bearings for sealing the extension; and means for introducing lubricating oil into said extension between the seals.

4. In a compressor as set forth in claim 2, said means for cooling the outer casing and inner compression chamber comprising side plates connected to the peripheral flange of each section respectively forming watertight coolant receiving chambers between said plates and the webs of the sections at each side of the outer casing communicating through said registering circular series of bores; one plate having a coolant inlet into the adjacent chamber and the other plate having a coolant outlet from the other chamber.

5. In a compressor as set forth in claim 1, said inner compression casing comprising an upper half and a complementary lower half separable on a diametrical split; said compression chamber receiving the rotor, the width of the chamber being equal to the width of the rotor which makes a running fit therein; the periphery of the rotor and of the chamber being rounded on the same radius; the side walls of the chamber on the horizontal axis of the compressor being spaced apart a distance equal to twice the radius of the rotor to make a running fit therewith; and the radii of the upper and lower walls of the compression chamber being formed on the same radius as the rotor but with the axes of said radii disposed equal distances above and below the axis of the rotor respectively, thereby leaving said crescent-shaped spaces between the top and bottom of the rotor and the top and bottom walls of the compression chamber disposed 180° apart in which spaces the vanes operate.

6. A rotary gas compressor comprising an outer casing of cylindrical shape having a cylindrical recess therein; a bearing carrier on said casing disposed axially of said recess; a power input shaft journaled in said carrier and extending into said recess; a cylindrical inner compression casing within and filling said recess, said inner casing having an axial hole for said shaft and having a non-cylindrical double bi-center semi-torus ring compression chamber therein provided with two sets of discharge gas ports and suction gas ports; a cylindrical rotor within said compression chamber keyed to said shaft and of width conforming with that of the combustion chamber, the periphery of the rotor and the peripheral wall of the compression chamber being rounded on the same radius whereby the rotor is tangent to the walls of the compression chamber at points on the horizontal axis of the shaft thereby leaving crescent-shaped compression spaces between the upper and lower portions of the rotor and the top and bottom portions of the compression chamber disposed 180° apart into which the discharge ports and suction ports extend; said rotor having four radial slots spaced 90° apart; slidable vanes in said slots having pe-

ripheries rounded on the same radius as the peripheral walls of the rotor and compression chamber; seals on the outer edges of the vanes; other seals in the side walls of the compression chamber on the horizontal axis of the shaft engaging the periphery of the rotor; further seals on the side walls of the rotor engaging the side walls of the compression chamber; means for introducing gas under pressure behind the first and last mentioned seals to maintain same in firm contact with the side and peripheral walls of the compression chamber to prevent leakage of gas therepast; and means for cooling the outer casing and inner compression chamber carried thereby.

7. In a compressor as set forth in claim 6, said outer casing being formed of complementary sections disposed side-by-side, each section comprising a circular member having a peripheral flange; means for connecting the flanges together; each section having a web intermediate the width of its flange provided with a series of bores adjacent to its periphery registering with the bores of the other section when assembled; and each web having a cylindrical recess in its inner face disposed inwardly of the circular series of bores, said recesses together forming a chamber when the sections are assembled receiving the inner compression casing.

8. In a compressor as set forth in claim 7, said bearing carrier being integral with one section and comprising a tubular extension on the axis of the compression casing housing said shaft; ball bearings adjacent the ends of the extension engaging the shaft; oil seals in said extension at the outer sides of the ball bearings for sealing the extension; and means for introducing lubricating oil into the extension between the seals.

9. In a compressor as set forth in claim 7, said means for cooling the outer casing and inner compression chamber comprising side plates connected to the peripheral flange of each section respectively forming watertight coolant receiving chambers between said plates and the webs of the sections at each side of the outer casing communicating through said registering circular series of bores; one plate having a coolant inlet into the adjacent chamber and the other plate having a coolant outlet from the other chamber.

10. In a compressor as set forth in claim 6, said inner compression casing comprising an upper half and a complementary lower half separable on a diametrical split disposed at a slight angle to the horizontal axis of the casing; said compression chamber receiving the rotor, the width of the chamber being equal to the width of the rotor which makes a running fit therein; the periphery of the rotor and of the chamber being rounded on the same radius; the side walls of the chamber on the horizontal axis of the compressor being spaced apart a distance equal to twice the radius of the rotor to make a running fit therewith; the radii of the upper and lower walls of the compression chamber being formed on the same radius as the rotor but with the axes of said radii disposed equal distances above and below the axis of the motor respectively, thereby leaving said crescent-shaped spaces between the top and bottom of the rotor and the top and bottom walls of the compression chamber disposed 180° apart in which spaces the vanes operate; and said other seals separating the crescent-shaped spaces and being mounted in the upper and lower halves respectively adjacent the diametrical split.

11. In a compressor as set forth in claim 6, each of said seals on the outer edges of the vanes having T-shaped bases seated in correspondingly-shaped slots in the outer edges of the related vanes, the outer edges of said seals being formed on the same radius as the periphery of the rotor and the peripheral wall of the compression chamber to snugly engage said wall.

12. In a compressor as set forth in claim 11, each seal being formed of Teflon impregnated with graphite, and being of sufficient depth to be wear-compensating.

13. In a compressor as set forth in claim 11, said means for introducing gas behind said first mentioned seals comprising registering pressure receiving ducts in the outer casing and compression casing on the axis of the shaft communicating with a bore in the inner end of the shaft registering with radial bores in the rotor extending outwardly through the slots and vanes to the undersides of the first mentioned seals.

14. In a compressor as set forth in claim 6, said further seals comprising circular sealing rings seated in annular grooves in the sides of the rotor disposed adjacent the shaft and adjacent the slots, said rings engaging the side walls of the compression chamber, and said rings being formed of Teflon impregnated with graphite and being of sufficient depth to be wear-compensating.

15. In a compressor as set forth in claim 14, said means for introducing gas behind said last mentioned seals comprising registering ducts in the outer casing and compression casing on the axis of the shaft communicating with a bore in the inner end of the shaft registering with

bores in the rotor extending outwardly and laterally to the undersides of the seals.

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DONLEY J. STOCKING, *Primary Examiner.*

W. J. KRAUSS, *Assistant Examiner.*