J. O. CARREY.

COMPRESSOR.

APPLICATION FILED JULY 28, 1919.

1,364,246.

Patented Jan. 4, 1921.

Fig. 1.

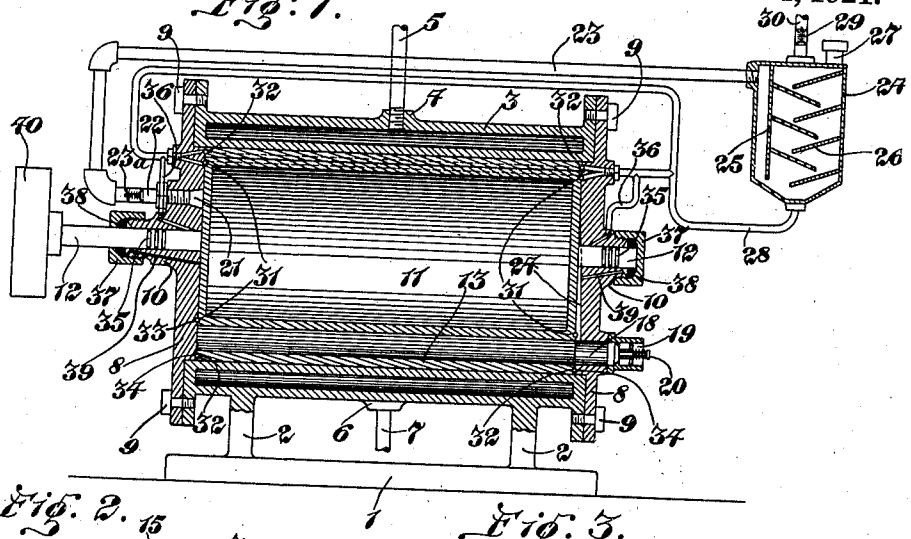


Fig. 2.

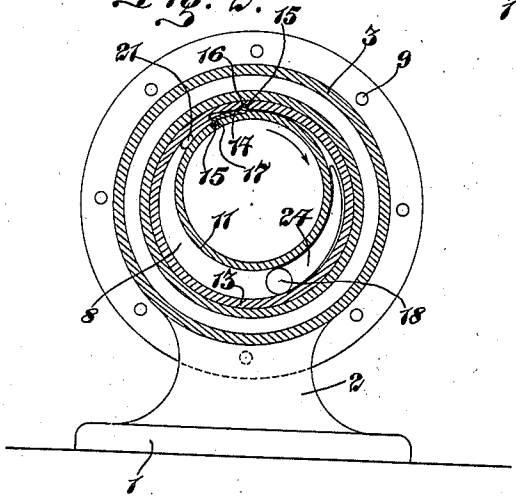


Fig. 3.

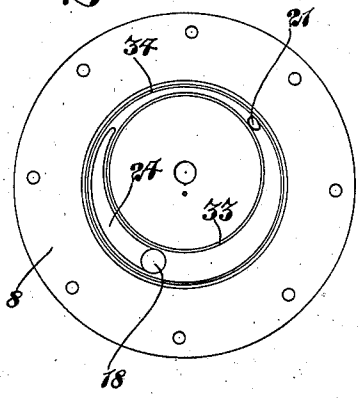
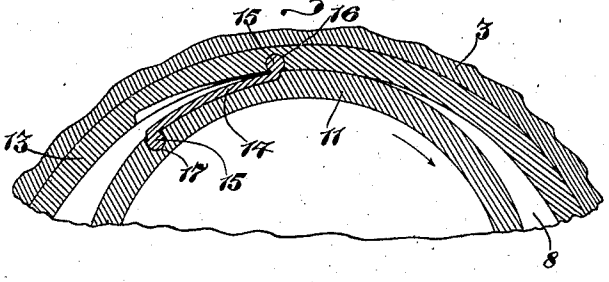


Fig. 4.



Attest.

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UNITED STATES PATENT OFFICE.

JOHN O. CARREY, OF ST. LOUIS, MISSOURI, ASSIGNOR TO CARREY ROTARY ENGINE COMPANY, OF ST. LOUIS, MISSOURI, A CORPORATION OF MISSOURI.

COMPRESSOR.

1,364,246. Specification of Letters Patent. Patented Jan. 4, 1921.

Application filed July 28, 1919. Serial No. 313,743.

To all whom it may concern:

Be it known that I, JOHN O. CARREY, a citizen of the United States, residing at the city of St. Louis and State of Missouri, have invented new and useful Compressors, of which the following is a specification.

This invention relates to improvements in compressors, and consists in the novel design, arrangement and combination of parts hereinafter disclosed.

An object of the invention is to provide a compressor, including interfitting rotary cylinders with the space between the walls of the cylinders being separated by a hinged wall connection forming a compression chamber, whereby upon each rotation of the cylinders, a charge of air or gas is induced into the compression chamber and compressed for delivery to a discharge passage.

Another object of the invention is to produce a compressor of the rotary type, adapted to compress air or other gas to a high pressure, with a minimum use of power.

Another object of the invention is to produce in a rotary compressor, a novel system for lubrication and for sealing the compression chamber.

Additional objects and advantages of the construction will appear from the following detailed description thereof taken in connection with the accompanying drawing, in which—

Figure 1 is a vertical section through the compressor showing the construction thereof.

Fig. 2 is a vertical cross section through the compressor.

Fig. 3 is an inner face view of one of the end plates of the compressor case removed.

Fig. 4 is a fragmentary sectional view showing, in further detail, the construction of a hinged plate connection between the rotors.

As illustrated in the drawing, the compressor includes a base plate 1 having supporting standards 2 near each end thereof. A cored cylindrical casting 3 is formed integrally with the standards 2 and is supported thereby. The cored space between the walls of the casting 3 forms a water jacket for cooling purposes, which is supplied with water through a hollow boss 4 in which a supply pipe 5 is connected.

The cooling fluid circulates through the water jacket and is discharged through a hollow boss 6, into which is threaded a discharge passage 7.

End plates 8, are secured to both ends of the casting 3 by bolts 9. The end plates are formed with axially alined hollow bosses 10, which constitute bearings for the shaft of the interior rotor. The bearing members are eccentrically positioned with respect to the axis of the end plates.

The interior rotor 11 is in the form of a hollow cylinder, having inclosing integral end members, from the center of which a supporting shaft 12, extends. The shaft 12 being journaled in the bearing members 10.

An external rotor 13 fits over the rotor 11, and is in the form of an open ended cylinder. The periphery of the rotor 13 is a ground surface which matches the ground surface of the interior casting 3, the casting 3 constituting a bearing for the rotor 13.

The rotors 11 and 13 are longitudinally connected by a hinged leaf 14, which has round knuckles 15 extending from opposite sides of the leaf, said knuckles fitting into corresponding channels 16 and 17 in the walls of the rotors 13 and 17, respectively.

The leaf 14, since the space between the leaf and the respective rotors is maintained sealed by a lubricant that enters channels 16 and 17, constitutes an air-tight connection dividing the space between the rotors into a non-communicating compression chamber.

The air inlet port 18 is formed in one of the head members 8, into which is connected an air supply passage 19, having a check valve 20 therein.

An outlet port 21 is formed in the opposite head-piece 8 and is positioned so as to be at an advanced point on the circumference of the compression chamber.

A discharge passage 22, having a check valve 23ª therein communicates with the discharge port 21.

Since the rotors rotate on eccentric axes

with respect to each other, the space between them, or the compression chamber, is alternately enlarged and contracted. The inlet port is so positioned that a volume of air or other gas will be admitted to the compression chamber, when it is enlarged to its greatest extent. The volume of air or other gas, thus admitted, is compressed as the rotation of the rotors continues, and the space therein contracted, from the point of inlet to the point of discharge through the discharge port. The volume of gas cannot pass beyond the discharge port as the two surfaces of the rotor meet at a point in advance of the discharge port.

In order to prevent the forming of a vacuum in the compression chamber after the air or other gas has been discharged through the discharge port, a backwardly extending groove or channel 24 is formed in the head-plate 8 adjacent to and communicating with the inlet opening. Thus, immediately after the discharge of the compressed gas from the compression chamber, the compression chamber, as it begins to enlarge, receives a fresh charge of air or gas, thereby preventing back pressure or choking of the compressing action of the compressor.

The lubrication and the sealing of the compression chamber is accomplished by an automatic system of distribution of the packing or lubricating fluid.

The discharge passage 23 carries the compressed air or gas from the compressor into a separator, comprising a case 24 in which is a vertical baffle wall 25 and staggered downwardly inclined baffle walls 26.

The lubricating or packing fluid is induced in the system through a filler opening 27 in the case of the separator, from which it is conducted on the low pressure side through a distributing conduit 28.

The oil or other lubricating fluid constitutes a seal for the discharge opening for the conduit 28, from the separator so that the compressed volume of air or gas is forced out of the upper part of the separator case into a discharge conduit 29, in which there is a check valve 30, from which it may be conducted to a storage tank or other point for use.

In the ends of the rotors 11 and 13 are grooves or channels 31 and 32 respectively, which match with grooves 33 and 34 formed in the end members 8 upon the same circumference with the grooves 31 and 32, respectively.

The lubricating fluid is supplied from the distributing conduit 28 to the grooves in the rotors and in the end members. As these grooves are constantly filled with the packing and lubricating fluid, an oil seal for the compression chamber joints is provided. Additionally, a sufficient quantity of the lubricant will find its way into the space between the exterior of the rotor 13 and the interior of the casting 3 to provide lubrication for the bearing between these two members.

Likewise, the lubricant will be forced into the channels 16 and 17 in the rotors, constituting a seal for the hinged plate connection with the rotors, and also serving to reduce the friction in the hinged connection between the rotors.

The shafts 12 are provided with a plurality of annular grooves 35, and by-pass 36, entering from the lubricant distributing conduit 28 provides means for lubricating the journals. The lubricant is delivered near the inner ends of the shafts 12, and is worked outwardly to the ends of the bearings.

The ends of the bearings are threaded to receive packing caps 37 in which a quantity of loose packing 38 is placed. The lubricant works into the packed glands formed by the caps 37 and is returned into the circulating and lubricating system through the passages 39.

The rotors may be driven from any suitable source of power, either by direct or indirect connection with the source of power. The indicated means being a power pulley 40.

It will be understood from the foregoing that the expansion and contraction of the space between the rotors 11 and 13 develops a compression action whereby, upon each complete cycle of rotation, a volume of air is drawn into the compression chamber in its extended form and compressed therein, and discharged from the compression chamber when the chamber is contracted. The walls of the rotors approach and recede from each other by reason of the axes thereof, being arranged on eccentric points.

The lubricating and packing system for the lubrication of the mechanism and for the packing of the compression chamber may be clearly understood from the specific description above given.

I am aware that the construction may be modified in certain particulars, without departure from the spirit and scope of the invention, I do not limit myself, therefore, to the exact construction shown and described, but what I claim and desire to secure by Letters Patent, is:—

1. In an apparatus of the class described, the combination with a cylindrical case, of a cylindrical external rotor mounted in said case having an unobstructed inner surface, an internal rotor within said external rotor having an unobstructed outer surface, a shaft supporting said internal rotor eccentrically with respect to said external rotor

arranged to maintain a permanent line of contact between said rotors at one side of the axis of said shaft, and a hinged plate pivoted to the walls of said rotors respectively constituting a partition between the rotors.

2. In an apparatus of the class described, the combination with an external rotor, of a cylindrical case wherein said external rotor is rotatably mounted, an internal rotor mounted within said first-named rotor, a shaft supporting said internal rotor so that the axis thereof is eccentric with respect to the axis of rotation of said first-named rotor, and whereby a permanent line of surface contact may be maintained between said rotors, a hinged plate having fixed pivot connection with the walls of said rotors respectively, constituting a partition for the space between the rotors and being foldable within the segment of contact between the rotors, whereby said line of contact between the rotors is maintained, an inlet passage opening into the space between the rotors, and an exhaust passage communicating with said space and arranged to register with the space on the side of said plate opposite the inlet passage.

3. In an apparatus of the class described, the combination with a cylindrical case having a water jacket within the wall thereof, of a cylindrical rotor mounted in said case, said rotor having an unobstructed inner surface, an internal rotor having an unobstructed outer surface mounted within said first-named rotor, revoluble supports for said internal rotor, said supports being arranged to rotate on an axis eccentric to the axis of rotation of said first-named rotor and so positioned as to maintain a constant line of contact between the surfaces of said rotors, a plate having direct and fixed pivot connection with the walls of said rotors, and liquid sealing devices between the ends of the rotors and the case.

4. In an apparatus of the class described, the combination with a cylindrical case, of a cylindrical rotor mounted in said case, said rotor having a smooth unobstructed inner surface, an internal rotor having a smooth unobstructed surface mounted within said first-named rotor, journal bearings in the end walls of said case positioned eccentrically with respect to the axis of the case, shafts journaled in said bearing for supporting the internal rotor, said shafts having a series of annular grooves therein, means for introducing a liquid in said groove to constitute a liquid seal, a hinge plate between the rotors having a pivot connection with the walls of the rotor and being foldable within the line of contact between the rotors, and means for admitting and discharging air into and from the space between the rotors.

5. In an apparatus of the class described, the combination with a cylindrical rotor, of a cylindrical case wherein said rotor is mounted for rotation, an internal rotor within said first-named rotor, means for revolubly suporting said internal rotor eccentrically of said first-named rotor in such position that a constant line of surface contact is maintained between the rotors, a plate extending longitudinally with said rotors and having hinged connection with the adjacent walls thereof, said plate being foldable, a recess in one of said rotors for receiving said plate when said plate is in its folded position, an inlet port communicating with the space between the rotors, an outlet port positioned at an advance point on the circumference of the space between the rotors, a discharge conduit leading from said outlet port, and a separator device into which said exhaust passage discharges.

6. In an apparatus of the class described, the combination with a stationary cylindrical case having removable heads, a rotor in the form of an open-ended cylinder journaled to rotate in said case, shafts journaled in said case having an axis disposed eccentrically with respect to the axis of said rotor, an internal rotor in the form of a closed cylinder fixed on said shafts, an inlet valve mounted in said case and communicating with the space between the rotors, the case having a cut-out portion extending from one side of said inlet valve constituting a pressure release chamber, a discharge valve positioned in advance of the inlet valve and arranged to discharge the volume of gas from the space between the rotors after the volume has been compressed by the relative movement of the rotors, a plate pivoted in the walls of said rotors respectively and extending longitudinally thereof, said plate being arranged to fold within the circumference of said external rotor, and means for revolving the shafts upon which said internal rotor is mounted.

7. An apparatus of the class described, comprising an internal and an external rotor mounted in eccentric relation and arranged to maintain a permanent line of contact between the surfaces thereof, a plate pivotally connected with said rotors and being arranged to fold within the wall of one of said rotors, and means for rotating said rotors whereby the space therebetween will be gradually increased and diminished.

8. An apparatus of the class described, comprising an external and an internal rotor mounted for rotation in eccentric relation and arranged to maintain a constant line of contact between the surfaces thereof, a piston plate extending longitudinally with the axes of said rotors and being pivoted within the walls of said rotors respectively, and ar-

ranged to move in an arc in excess of the space between the rotors, and means for revolving said rotors.

9. An apparatus of the class described, comprising an external rotor having an unobstructed inner surface and being provided with a groove therein extending longitudinally of the axis thereof, an internal rotor mounted eccentrically with respect to said internal rotor and positioned so that a constant line of contact is maintained between the surfaces of said rotors, a plate pivoted to said rotors respectively and being arranged to fold within the recess formed in said external rotor, and means for rotating said rotors.

JOHN O. CARREY.