J. O. CARREY.

ROTARY AIR COMPRESSOR.

APPLICATION FILED DEC. 22, 1919.

1,379,248.

Patented May 24, 1921.

2 SHEETS—SHEET 1.

Fig. 1

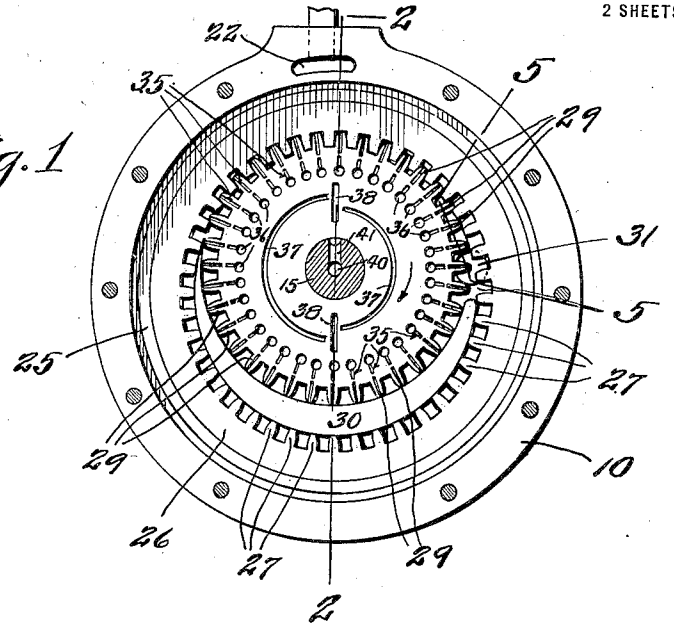
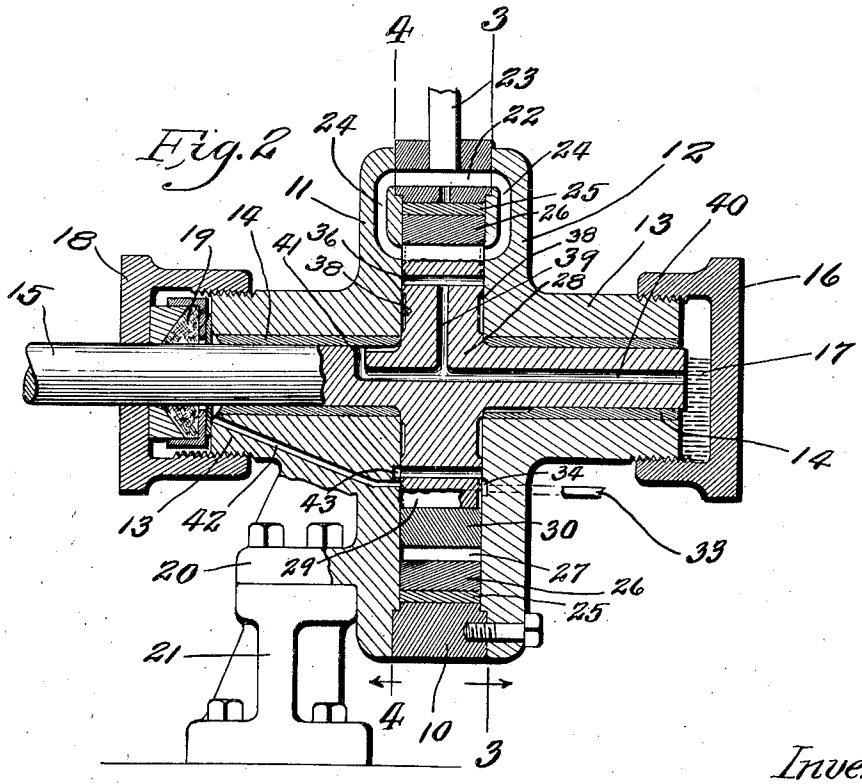


Fig. 2



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Fig. 3

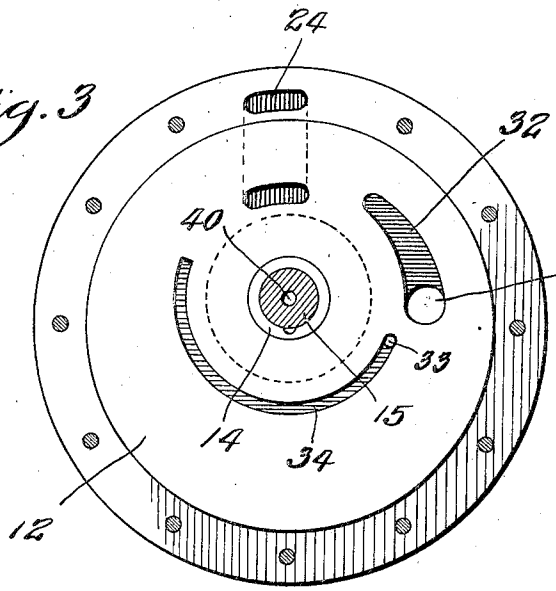


Fig. 5

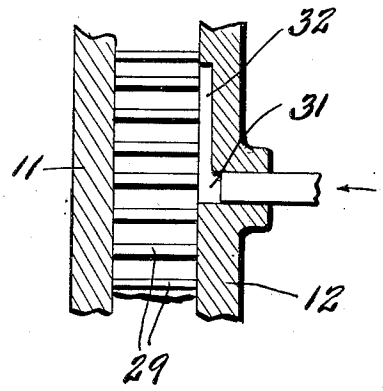
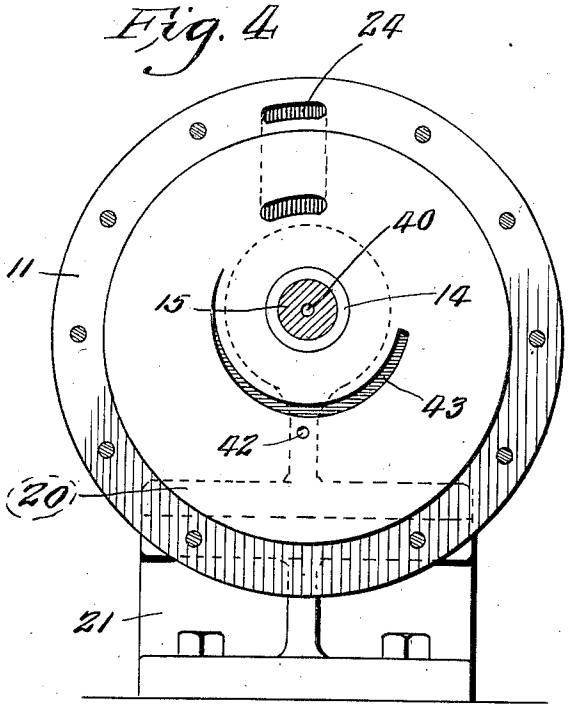


Fig. 4



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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.

ROTARY AIR-COMPRESSOR.

1,379,248. Specification of Letters Patent. Patented May 24, 1921.

Application filed December 22, 1919. Serial No. 346,575.

To all whom it may concern:

Be it known that I, JOHN O. CARREY, a citizen of the United States, residing at St. Louis, Missouri, have invented a certain new and useful Improvement in Rotary Air-Compressors, of which the following is a full, clear, and exact description, such as will enable others skilled in the art to which it appertains to make and use the same, reference being had to the accompanying drawings, forming part of this specification.

My invention relates to an air or fluid compressor, the principal objects of my invention being to generally improve upon and simplify the construction of the existing and generally used forms of fluid compressors, and to provide a relatively simple and easily operated structure which may be effectively and economically used wherever it is desired to rapidly compress to a relatively high degree of pressure, air, gas, or other fluids.

Further objects of my invention are to provide an improved and efficient seal or liquid packing between the fixed and movable parts of the compressor so as to minimize the leakage of fluid from the compressor, and, further, to provide simple means for continuously lubricating the operating parts of the apparatus.

My invention is characterized by the arrangement of a pair of rotors within a housing, said rotors having interengaging parts and one of said rotors being eccentrically disposed within the other.

With the foregoing and other objects in view, my invention consists in certain novel features of construction and arrangement of parts, hereinafter more fully described and claimed, and illustrated in the accompanying drawings, in which—

Figure 1 is an elevational view of a compressor of my improved construction with one of the heads or side plates thereof removed.

Fig. 2 is a vertical section taken approximately on the line 2—2 of Fig. 1.

Fig. 3 is a sectional view taken approximately on the line 3—3 of Fig. 2.

Fig. 4 is a vertical section taken approximately on the line 4—4 of Fig. 2.

Fig. 5 is a detail section taken approximately on the line 5—5 of Fig. 1.

Referring by numerals to the accompanying drawings which illustrate a practical embodiment of my invention, 10 designates a ring which forms the annular wall of the housing of the compressor and applied to the sides of said ring and secured thereto in any suitable manner are disk-shaped heads 11 and 12 which coöperate with the ring 10 in forming the housing.

Formed integral with the heads 11 and 12 are centrally arranged outwardly projecting tubular members 13 within which are arranged bushings 14 that serve as bearings for the driving shaft 15 of the compressor.

Removably positioned on the outer end of the tubular member 13 that projects from head 12 is an imperforate cap 16, the space 17 within which forms a liquid lubricant chamber. Removably positioned on the tubular member 13 that projects from head 11 is a cap 18 in the center of which is formed an aperture for the accommodation of shaft 15, and arranged in the chamber within this cap 18 is a suitable packing ring 19 which is effective in preventing the leakage of liquid lubricant outwardly along the surface of the shaft 15 and through the aperture in said cap 18. Either one or both of the heads 11 and 12 may be provided with a bracket such as 20 and which latter may be fixed to a suitable supporting base 21.

Formed through the upper portion of the ring 10 is a transversely disposed port 22, and tapped into the ring and leading from this port to a suitable compressed fluid container (not shown) is a pipe 23. Formed in the upper portions of the heads 11 and 12 are vertically disposed ports 24, the upper ends of which communicate with the transverse port 22, and the lower ends communicating with the rotor chamber within the housing.

Fitting snugly within the housing ring 10 is a bearing ring 25 and positioned therein with its outer circumference or periphery bearing against the inner face of said ring 25 is the annular rotor 26 of the compressor. The inner periphery of this annular rotor is provided with teeth 27, either straight or of the herring-bone type.

Rigidly fixed upon shaft 18 and disposed within the annular rotor 26 is the inner rotor 28 of the compressor, said inner rotor being provided on its periphery with teeth 29 which mesh with the internal teeth 27 on

ring 26. The parts just described are constructed so that the inner rotor 26 is eccentrically disposed within the annular rotor 26 and the arrangement is such that the point where the teeth of the two rotors engage to the greatest depth is in the same plane with the lower ends of the ports 24, and such point obviously being the point of highest compression in the compressor.

Positioned within the space between the two rotors is a crescent shaped filler block 30, the inner radius of which corresponds to the radius of the internal rotor 28 so that the outer faces of the teeth 29 ride directly against said inner radius and the outer or external radius of said block corresponding to the inner radius of the rotor 26 so that the inner faces of the teeth 27 bear directly against the outer radius or face of said block.

One end of the filler block 30 terminates in a plane slightly below the horizontal plane occupied by the axis of shaft 15 and formed through head 12 immediately above this end of the filler block is an aperture 31 which admits the air or other fluid that is to be compressed. This inlet aperture communicates with an arcuate recess 32, which latter extends upwardly toward the point of high compression between the rotors and being for the purpose of admitting air or other fluid to the spaces between the interengaging teeth of the rotors.

The means utilized for lubricating the compressor and for providing a liquid seal between certain of the operating parts includes an oil supply pipe 33 that leads from a suitable oil separator (not shown) and through which separator passes the air or fluid that is compressed in the apparatus. Obviously the oil from this oil separator is under pressure and it passes through supply pipe 33 into one end of an arcuate groove 34 that is formed in the inner face of head 12. This groove is concentric with and disposed vertically below the axis of shaft 15 and its upper end terminates a short distance from the lower end of the corresponding port 24. (See Fig. 3). This arcuate groove is disposed so that it bridges the space and establishes communication between the inner and outer portions of the radially disposed liquid sealing grooves 35 that are formed in the corresponding side face of the internal rotor 28. There is a pair of these grooves for each tooth of the internal rotor and the inner ends of the inner portions of said grooves communicate with transversely disposed apertures 36 that are formed through the body of the internal rotor. The outer ends of the outer portions of said grooves terminate at the outer faces of the teeth 29.

It will be understood that both side faces of the internal rotor 28 are provided with radially disposed grooves 35, likewise both side faces are provided with substantially semi-circular concentric liquid sealing grooves 37, the radius of one being slightly smaller than the other, there being radially disposed grooves 38 formed between the ends of said semi-circular grooves.

It will be understood that during the operation of the machine, all of the grooves just mentioned will become filled with oil under pressure, and as a result, the moving parts of the apparatus will be thoroughly lubricated and at the same time an effective seal will be provided to minimize leakage of air from the compressor.

In order to provide for the lubrication of the bearings for the shafts 15 in the heads 11 and 12, a radially disposed duct 39 extends from one of the transverse apertures 36 in the internal rotor to an axially disposed duct 40, that is formed in shaft 15, and which extends from the end of the shaft that terminates in cap 16 to a point beyond the internal rotor and in the last mentioned point, this axially disposed duct communicates with a short radially disposed duct 41 that leads to the exterior of that portion of shaft 15 that is journaled in the bearing on head 11.

By virtue of this construction, oil under pressure passes from the transverse aperture 36 through the radial duct 39 and from thence through duct 40 and radial duct 41. Thus the inner surface of the bushing 14 in the head 11 is lubricated and the oil from chamber 17 delivered through duct 40 will pass into the bearing between the end of the shaft of the bushing in head 12.

Any leakage of oil outwardly past the bushing 14 that is located in the bearing on head 11 is conveyed back to the internal rotor chamber by means of a duct 42 which latter is formed through head 11 and its bearing, the outer end of said duct communicating with the chamber in cap 18 and the inner end of said duct communicating with the internal rotor chamber at a suitable point above the central portion of the crescent-shaped filler block 30 and preferably immediately above the path of travel of the teeth 29 on the internal rotor. (See Fig. 2.)

Formed in the inner face of head 11 and disposed concentric with and generally below the shaft 15 is a substantially semi-circular groove or recess 43 that is arranged so that it communicates directly with the ends of the transverse apertures 36 in the internal rotor, such construction providing for the distribution of oil onto the inner face of head 11.

The operation of my improved fluid compressor is as follows:

Shaft 15 carrying the internal rotor 28 is rotated at the proper speed in the direction indicated by the arrow in Fig. 1, and the teeth or projections on the periphery of said

internal rotor engaging with the internal teeth on the external rotor drives the latter at the same speed and in the same direction.

Air is drawn into the rotor chamber through inlet opening 31 and passes from thence into recess 32, and in the adjacent spaces between the teeth or interengaging projections of the rotors. The air thus drawn into the compressor is carried around to the opposite side of the rotor chamber and in so doing it travels above and below the crescent-shaped filler block 30.

The teeth or interengaging portions of the rotors mesh or engage with each other in progressive manner after leaving the end of the filler block 30, thus gradually diminishing the area of the spaces between said teeth until the point of highest compression is reached, whereupon the compressed air or fluid will be forced outwardly in opposite directions from between the meshing teeth, and after passing upwardly through the ports 24, said compressed air or fluid will pass through the tubular connection 23 to the storage tank.

A rotary compressor of my improved construction is comparatively simple, comprises but few operating parts, can be driven with the expenditure of comparatively little power, and is capable of producing relatively high degrees of fluid pressure.

Inasmuch as the oil delivered into the compressor through supply pipe 33 is under pressure, said oil will be very thoroughly distributed through all the ducts, apertures, and pockets in the compressor, thereby effectively lubricating the operating parts of the compressor and providing a liquid seal to minimize the leakage of fluid pressure.

It will be readily understood that minor changes in the size, form and construction of the various parts of my improved compressor can be made and substituted for those herein shown and described, without departing from the spirit of my invention, the scope of which is set forth in the appended claims.

I claim:

1. In a fluid compressor, the combination of an external rotor and an internal rotor, a casing surrounding said external rotor, heads on each side of said casing, and a separate bearing ring loosely mounted for rotation between the periphery of said external rotor and said casing.

2. An internal rotor for a compressor of the character described having separated lubricating grooves, in combination with a head having a lubricating groove or recess for forming a connection between the separated grooves of the rotor in the course of the revolution of the latter.

3. A fluid compressor comprising a casing, heads on each side of said casing, an external rotor and an internal rotor mounted within the casing, the latter being provided with lubricating grooves and groove-connecting openings designed to coöperate with lubricating grooves in said heads in the course of revolution of said internal rotor, and means for supplying a lubricant under pressure to one set of grooves whereby said lubricant is forced under pressure through said grooves and openings to the low pressure side of the compressor.

In testimony whereof I hereunto affix my signature this 15th day of December, 1919.

JOHN O. CARREY.