F. GERLING.

REVOLVING COMPRESSOR.

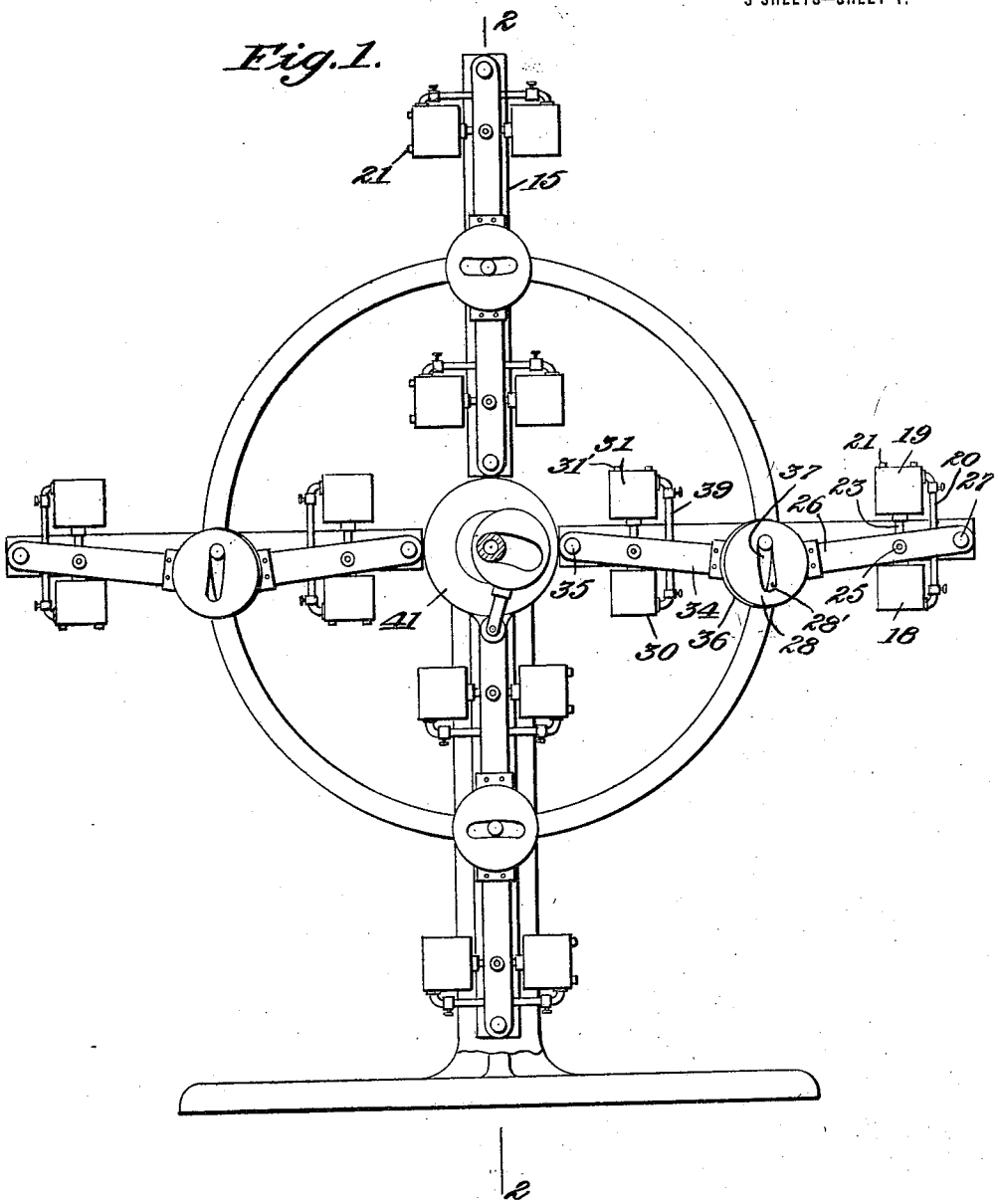
APPLICATION FILED APR. 25, 1921.

1,435,462.

Patented Nov. 14, 1922.

3 SHEETS—SHEET 1.

Fig. 1.



Inventor:
F. Gerling,

By Cushman, Bryant & Darby
Attys.

F. GERLING.

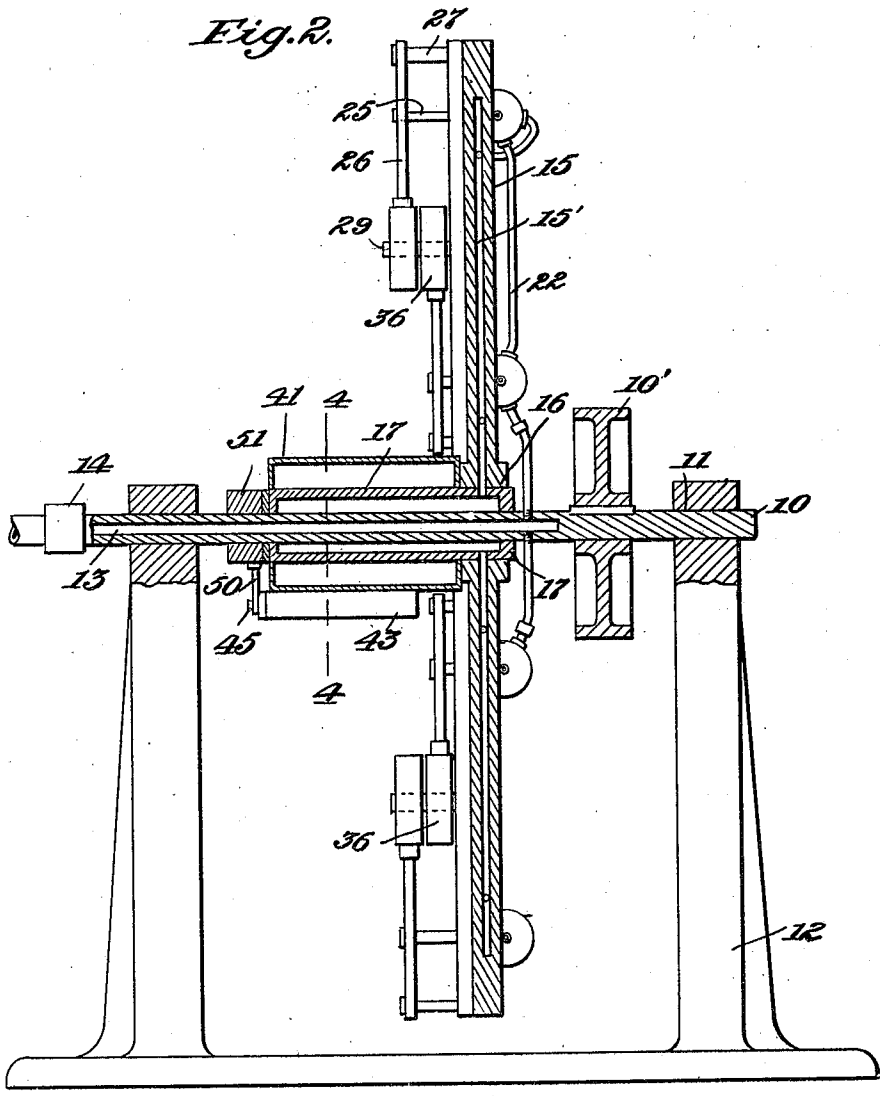
REVOLVING COMPRESSOR.

APPLICATION FILED APR. 25, 1921.

1,435,462. Patented Nov. 14, 1922.

3 SHEETS—SHEET 2.

Fig. 2.



Inventor:
F. Gerling,

By Cushman, Bryant & Darby
Attys.

F. GERLING.

REVOLVING COMPRESSOR.

APPLICATION FILED APR. 25, 1921.

1,435,462.

Patented Nov. 14, 1922.

3 SHEETS—SHEET 3.

Fig. 3.

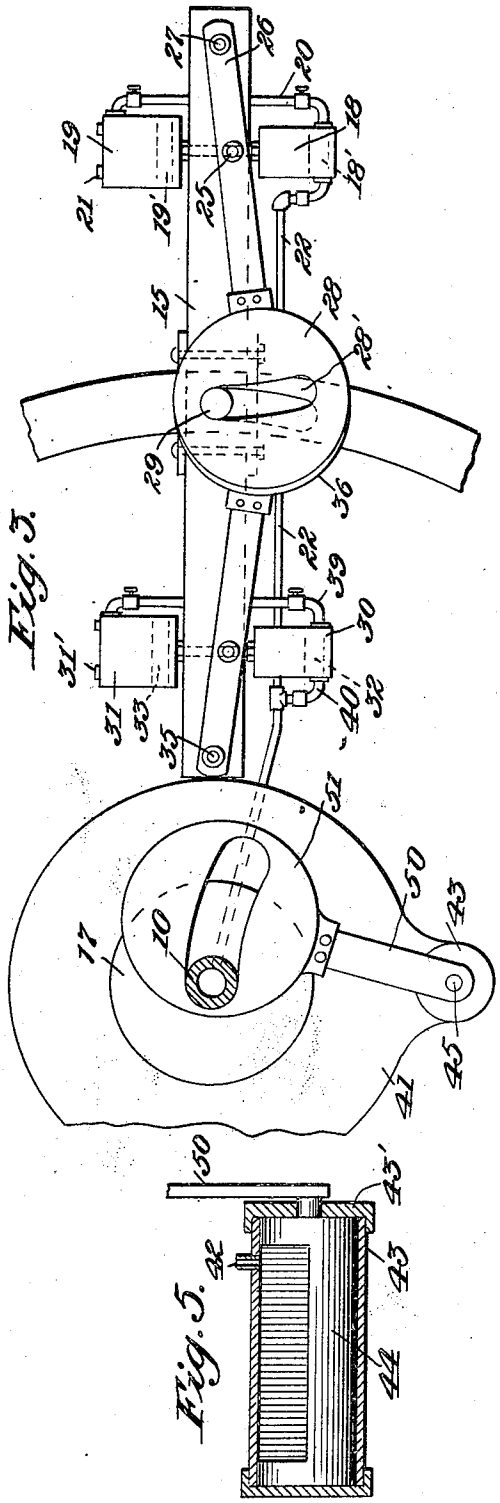


Fig. 4.

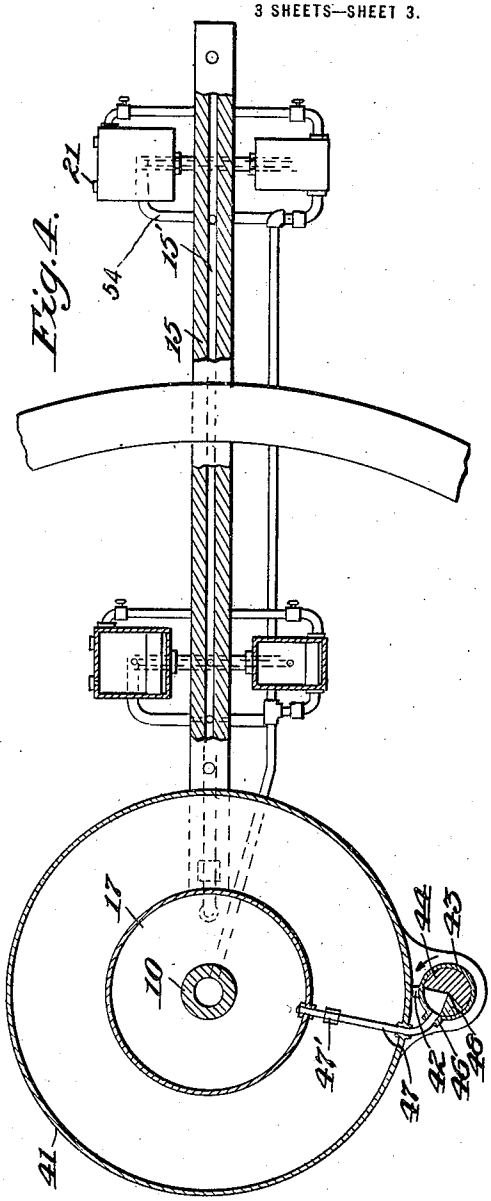


Fig. 5.

Inventor:
F. Gerling,

By Cushman, Bryant & Darby
Att'ys.

Patented Nov. 14, 1922. 1,435,462

UNITED STATES PATENT OFFICE.

FREDERICK GERLING, OF SILVER CITY, IDAHO, ASSIGNOR OF ONE-FOURTH TO DANIEL DALE LONG AND ONE-FOURTH TO RICHARD RICHARDSON, BOTH OF BOISE, IDAHO.

REVOLVING COMPRESSOR.

Application filed April 25, 1921. Serial No. 464,182.

To all whom it may concern:

Be it known that I, FREDERICK GERLING, a citizen of the United States, residing at Silver City, in the county of Owyhee and State of Idaho, have invented new and useful Improvements in Revolving Compressors, of which the following is a specification.

This invention relates to a device for compressing air and other fluids, and more particularly to a compressor of the revolving type, such as is shown in my Patent No. 1,408,188, Feb. 28, 1922.

An object of the invention is to provide a machine which has an extremely high compressing power, which may be operated with a minimum expenditure of power, and in which the vibration, friction and other retarding forces are very low.

The above and other objects of the invention, which will become obvious as the description proceeds, are attained by the provision of a compressor comprising a rotatable shaft upon which are radially disposed a plurality of sets of compressor cylinders, pairs of the members of each set of cylinders being preferably connected to form a low pressure cylinder and a high pressure cylinder. As in my Patent #1,408,188, the pistons which are located within the cylinders are actuated by a gravity operated means which, preferably, is in the form of pendulums which oscillate during the rotation of the shaft and are connected to the pistons. The invention is also characterized by the provision of a novel form of lubricating means for the compressors and other moving parts, the lubricating means also preferably being gravity operated.

In the accompanying drawings there is shown one form of a device in which my invention may be embodied, but it will be understood that numerous changes may be made in the structure disclosed in the drawings and hereinafter described in detail without departing from the scope of the invention.

In the drawings:—

Fig. 1 is a side elevational view of the compressor,

Fig. 2 is a longitudinal cross section of the same upon the line 2—2 of Fig. 1,

Fig. 3 is an enlarged view of one of the radiating arms and compressing means thereon,

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

Fig. 5 is a detail view showing the lubricating pump construction.

Referring to the drawings more in detail, 10 indicates a rotatable shaft which may be supported in bearings 11 formed in the upper ends of vertical arms 12. The shaft is preferably hollow throughout a portion of its length to form a chamber 13, and may be connected by means of a coupling 14 to a supply line for the compressed fluid, the fluid being conducted through this line to a suitable storing chamber or reservoir. Upon the shaft are mounted a plurality of sets of compressors; and for the purpose of supporting the sets of compressors there radiate from the shaft arms 15, which may have a common hub 16 surrounding one end of an oil compression chamber 17 shown as formed integral with the shaft. The arms 15 have central passages 15′ communicating with the oil compression chamber and serve as a conduit for the lubricating fluid which passes through them to the compressors and other moving parts of the device. At suitable points upon each arm are mounted compressor cylinders 18, 19, the cylinders being positioned in pairs and connected by pipes 20 so that the fluid compressed in one cylinder may be conducted to the other cylinder and still further compressed. In the illustrated embodiment of the invention the cylinders 19 are intended to serve as the low pressure cylinders, and the air or fluid may be admitted through inlet valves 21 and conducted from that cylinder, after compression, to the cylinder 18, from which it is conducted through the pipe line 22 to the hollow shaft. Pistons 18′, 19′ are located within each cylinder, and their piston rods 23 are freely connected to a pin 25 positioned at an intermediate point upon an oscillating arm 26 which is fixedly secured to a stub shaft 27 at substantially

the outer end of the supporting arm 15. The shafts 27 oscillate in their bearings within the arms 15 and are lubricated by oil passing through the conduits 15′ within each supporting arm in a manner hereinafter described. The oscillating arm 26 extends inwardly toward the shaft 10, and at its inner end is provided with a weight 28. It is, of course, desirable that the swinging movement of the arms 26 be limited by other means than the contacting of the pistons with the ends of the cylinders, and for this purpose the weights are shown as provided with arcuate slots 28′ through which extend studs 29 upon the supporting arms 15.

It will be understood that more than a single pair of cylinders could readily be connected to the oscillating arms 26, and it is desirable that the weights upon the arms be comparatively small. For this reason it is preferable that but a single pair of compressors be connected to one arm. When it is sought to increase the compressing power of the device an additional pair of cylinders may be placed upon the supporting arms, and if not connected to the pendulum which operates the compressors above described, an additional pendulum may be readily placed upon the arm. In the drawings there is shown upon each supporting arm a secondary pair of compressing cylinders 30, 31 having therein pistons 32, 33 connected through their piston rods with pendulums 34 which are fixedly secured adjacent the shaft 10 to studs 35 which rock within bearings in the arms 15 in the same manner as studs 27. Each pendulum 34 extends outwardly along its supporting arm and is provided with a weight 36 which may have a slot 37 through which extends the stud 29 for the purpose of limiting the movement of the pendulum. Each cylinder 31 may have an inlet valve 33′, and may be connected by means of a pipe 39 to the cylinder 32, each cylinder 33 thus serving as a low pressure, and each cylinder 32 serving as a high pressure cylinder. The cylinders 32 may be connected to the line 22 carrying the compressed fluid from the high pressure cylinders 18 to the shaft by means of a branch 40.

In order to lubricate the compressors and other moving parts of the device I have illustrated a gravity operated lubricating means which is more clearly shown in Figs. 2 and 4. Positioned to one side of the compressor supporting arms and upon the shaft 10 is a lubricating fluid reservoir 41 which surrounds the lubricating compression chamber 17. The reservoir may be filled from a suitable inlet opening (not shown) and formed with an outlet 42 (Fig. 4) which communicates with a small pump cylinder 43 upon the exterior of the reservoir. The cylinder 43 has one open end closed by a cap 43′ (Fig. 5) and working therein is a longitudinally extending rotary piston 44 with a piston rod 45 extending through the cap at one end of the cylinder. The cylinder 43 has an outlet 46 communicating through a conduit 47 with the compression chamber 17. Upon the interior of the pump cylinder 43 is a fixed longitudinally extending abutment 48 of triangular cross section, as shown in Fig. 4. The piston 44, at each end, is of cylindrical shape, the ends having bearings within the cylinder 43 for rotation of the piston within the cylinder. Intermediate its ends the piston has a segmental cut away portion into which projects the abutment 48, the cut away portion affording a chamber within the pump cylinder for the reception of fluid prior to its compression into the chamber 17. Upon the piston rod 45 is fixedly positioned an oscillating arm 50 extending toward the shaft 10 and having a weight 51 surrounding the shaft. It will be obvious that as the shaft and oil reservoir rotate the arm 50 will oscillate and thus move the piston 44 from its position shown in Fig. 4 in the direction indicated by the arrow. Upon this movement the oil which has flowed into the pump cylinder will be forced by the piston through the outlet 46 as it rotates in the direction of the abutment 48, to close the inlet 42, and outlet 46. In order to prevent a return of the lubricating fluid from the compression chamber 17, the conduit 47 may be provided with a check valve 47′.

From the compression chamber 17, which is filled by means of the pump structure 43, 44, the fluid takes a course through the passages 15′ within the supporting arms 15 to the oscillating shafts of the various pendulums and the compressor cylinders. It will be observed that the pendulums are pivotally supported upon the arms 15 and, therefore, oil can freely reach the bearings for the pendulum supporting shafts. Adjacent the compressor cylinders branch pipes 54 lead from the supporting arms to the compressor cylinders and thus lubricate the cylinders.

It is thought that the operation of the device will be clear from the above description of its construction. By way of résumé however, it might be stated that the shaft 10 will initially be rotated from a prime mover of any suitable character, the power being applied to the pulley 10 located upon the shaft. As the supporting arms 15 and their compressors are rotated the pendulums will oscillate about their centers of oscillation and actuate the pistons within each of the compressor cylinders. The fluid compressed in each of the cylinders 19 will pass to the cylinders 18 to be still further compressed, and the fluid from the cylinders 33 will likewise be conducted to the

cylinders 32 for the same purpose. From the cylinders 18 and 32 the compressed fluid is connected from the conduit 22 and the hollow portion 13 of the shaft 10, and through the supply line to a storage chamber. During the rotation of the shaft 10 the oil pump 43 is operated by the oscillations of the arm 50 and its weight 51, causing a thorough lubrication of the compressor cylinders and the other moving parts of the machine.

From the above description it will be noted that one of the principal differences between this machine and that disclosed in my Patent #1,408,188 is the association with each pendulum of a pair of cylinders, one cylinder serving as a low pressure cylinder and the other as a high pressure cylinder. By conducting the compressed fluid from one cylinder to the other before discharging it into the reservoir there is permitted a decrease in the size of the weights upon the pendulums since it is not necessary to raise the fluid in one cylinder to its final pressure.

I wish it to be understood that the invention is not limited to the particular type of lubricating means shown, or to such details of the fluid compressing means as may be varied without departing from the scope of the invention, which is more particularly defined in the following claims:

1. A device of the class described comprising a rotatable shaft, a plurality of arms radiating from said shaft; a plurality of sets of compressors on each arm, each set of compressors comprising a low pressure cylinder, a high pressure cylinder and a conduit between said cylinders, gravity operated means on each arm for actuating said pairs of compressors, and a conduit for conducting the fluid from said sets of compressors.

2. A device of the class described comprising a rotatable shaft, a plurality of arms radiating from said shaft; a plurality of pairs of compressors on each arm, each pair of compressors comprising a low pressure cylinder, a high pressure cylinder and a conduit between said cylinders; and gravity operated means on each arm for actuating said pairs of compressors, said actuating means comprising a plurality of pendulums oscillating on each arm, each pendulum being connected to a pair of compressors.

3. A device of the class described comprising a rotatable hollow shaft, a plurality of arms radiating from said shaft and pairs of compressing cylinders mounted upon said arms, the members of each pair of cylinders communicating to form low and high pressure cylinders, a conduit leading from each high pressure cylinder to said shaft, a pendulum pivoted at substantially the outer end of each arm and extending inwardly toward the shaft, another pendulum pivoted adjacent said shaft and extending outwardly on the arm pistons in said cylinders, and connections between said pendulums and said pistons.

4. In a device of the class described, a rotatable shaft, a plurality of radially disposed pairs of air compressors mounted upon said shaft for rotation therewith, each pair of compressors comprising a low pressure cylinder, a high pressure cylinder, and a conduit between said cylinders, gravity operated means operable during the rotation of said shaft for actuating said compressors, and means for lubricating the moving parts of said device, said lubricating means comprising a compression tank and gravity operated means including a cylinder and an oscillating piston therein for forcing a lubricating fluid into said tank.

5. In a device of the class described, a rotatable shaft, a plurality of arms radiating from said shaft and rotatable therewith, a plurality of pairs of compressor cylinders mounted upon each arm, each pair of compressor cylinders comprising a low pressure cylinder and a high pressure cylinder, a plurality of pendulums oscillatably mounted upon each arm, each pendulum being connected to a pair of compressors, and said pendulums being arranged with their centers of oscillation at opposite ends of the arm, and gravity operated means including a cylinder and an oscillating piston therein operable during the rotation of the shaft for lubricating the moving parts of the device.

In testimony whereof I have hereunto set my hand.

FREDERICK GERLING.