

Sept. 23, 1941.

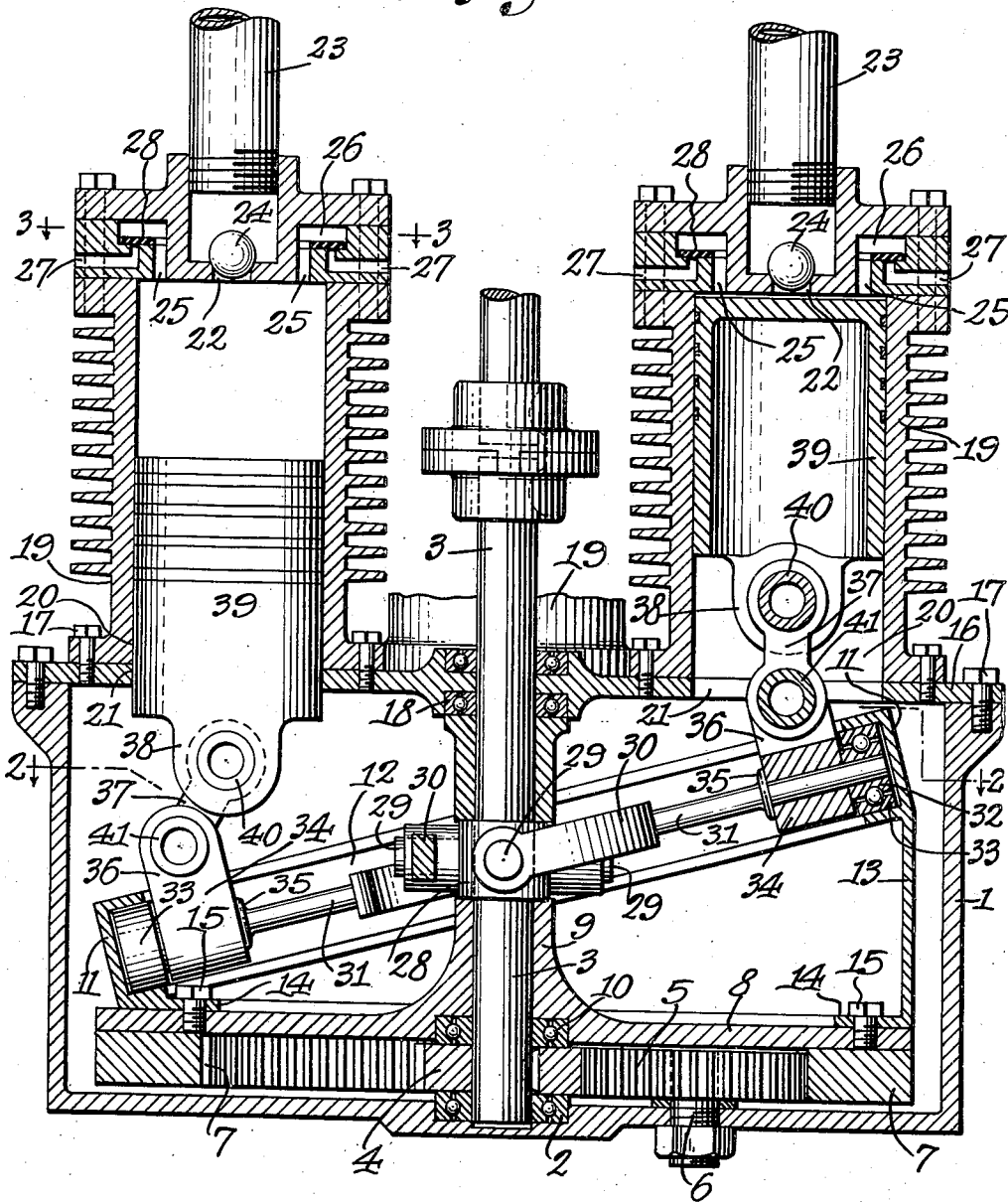
P. SAPPINGTON
AIR COMPRESSOR

2,256,952

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2 Sheets-Sheet 1

Fig. 1.



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Fig. 2.

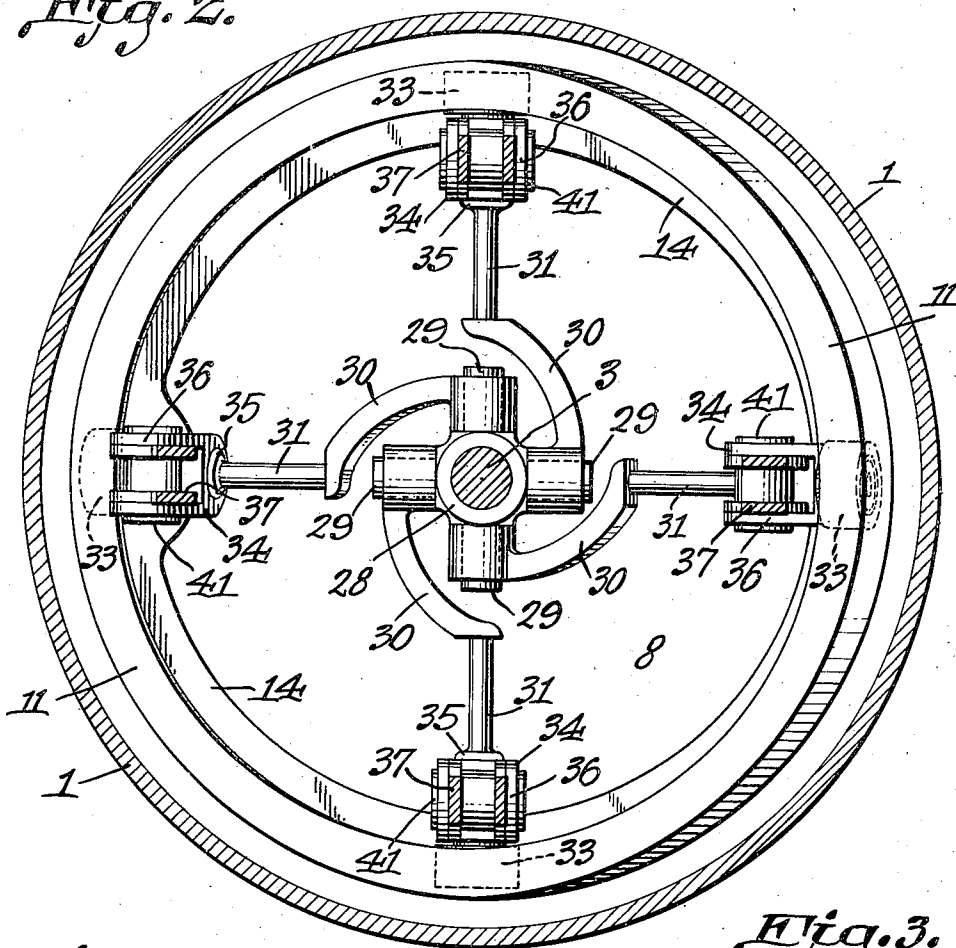


Fig. 4.

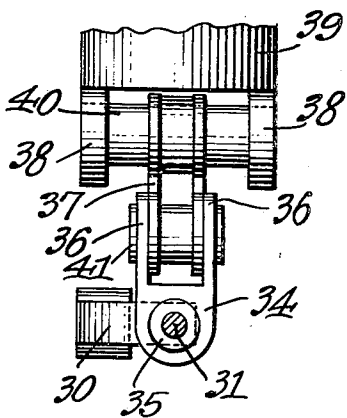
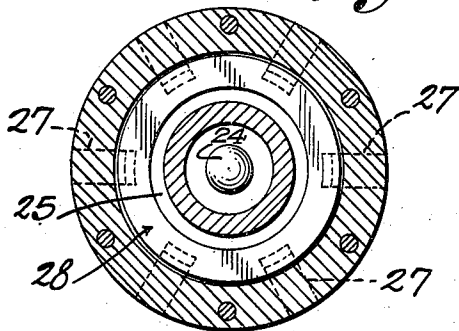


Fig. 3.



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UNITED STATES PATENT OFFICE

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AIR COMPRESSOR

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Application August 7, 1939, Serial No. 288,878

1 Claim. (Cl. 230—186)

This invention relates to air compressors and an object is to provide an apparatus of this character which does not utilize cranks such as commonly employed for actuating the pistons but, instead, employs an inclined circular track which is fixedly mounted and constitutes a guide for piston connections whereby, during the rotation of the drive shaft, a series of pistons grouped about the axis of rotation, will be actuated successively to expel air under pressure from the apparatus.

A further object is to provide apparatus of this character which is simple and compact in construction, will not readily get out of order, and which will operate efficiently to produce the desired results.

With the foregoing and other objects in view which will appear as the description proceeds, the invention consists of certain novel details of construction and combinations of parts hereinafter more fully described and pointed out in the claims, it being understood that changes may be made in the construction and arrangement of parts without departing from the spirit of the invention as claimed.

In the accompanying drawings the preferred form of the invention has been shown.

In said drawings

Figure 1 is a central vertical section through the apparatus, parts being broken away and the drive shaft and some of the parts mounted thereon, being shown in elevation.

Figure 2 is a section on line 2—2, Figure 1.

Figure 3 is a section on line 3—3, Figure 1.

Figure 4 is an elevation of one of the piston connections, the arm engaging the same being shown in section.

Referring to the figures by characters of reference, 1 designates the base of the compressor which is preferably in the form of a circular housing the bottom of which carries a bearing 2 in which is seated one end of the main drive shaft 3. Secured to this shaft so as to rotate therewith is a small drive gear 4 which meshes with an intermediate gear 5 mounted on a stud 6 secured in the bottom of the housing 1. The intermediate gear, in turn, meshes with an internal ring gear 7 secured to the underside of a disk 8 having a central hub 9 which is mounted for rotation relative to the shaft 3, said shaft being extended through the hub and there being an anti-friction bearing 10 interposed between the disk and the shaft as shown.

Extending around shaft 3 and located wholly within the housing 1 is a circular track 11 the

inner peripheral portion of which is formed with a channel 12 extending continuously within the said surface. The track 11 is inclined relative to disk 8 and shaft 3 and is joined to the disk by an integral supporting casing 13 having an inwardly extended flange 14 at its lower end which rests upon the peripheral portion of disk 8 and is held thereto by bolts 15 or the like. The center of the area surrounded by track 11 is in line with the axis of rotation of shaft 3. Housing 1 is provided with a detachable cover plate 16 secured thereto by bolts 17 or the like and this cover plate has bearings 18 in which the track is journaled. Compressor cylinders 19 are secured on the cover plate and have open lower ends 20 which register with openings 21 in the cover plate 16. Any desired number of these cylinders can be mounted on the cover plate and each of them is provided at its upper or outer end with outlet ports 22 from which is extended an outlet pipe 23, there being a suitable valve 24 for closing the port against flow of air downwardly into the cylinder but which will open under pressure of air from within the cylinder.

Intake port 25 is formed in the head of the cylinder and opens into an air intake chamber 26 into which open air supply ports 27. These ports are normally closed by rings 28 loosely mounted in chamber 26 and normally seated by gravity as shown. The rings do not close the ports 25. Thus when air is being placed under pressure in cylinder 19, valve 24 will be unseated. However when it is desired to draw air into the cylinder, valve 24 will seat while the pull of air through ports 25 from ports 27 will result in unseating the ring valve 28. During the compression of air, however, the ring valve will drop to its seat and will be held thereto by pressure within the cylinder, ports 25 and chamber 26.

Located on and secured to shaft 3 directly above the hub 9 is a collar 28 and extending radially from this collar are studs 29 equal in number to the number of cylinders on the cover plate 16.

Pivotaly mounted on each stud 29 is one end of an arcuate arm 30 and extending outwardly from each arm 30 is a rod 31. Each rod is mounted in a plane extending longitudinally of and radially from the axis of rotation of shaft 3. Each rod carries, at its outer end, a bearing 32 on which is mounted a roller 33 and each roller is located in the channel 12 which it can travel therealong. Mounted on each rod 31 adjacent to bearing 32 is a block 34 held in place by a collar 35 on the rod. This block has an upwardly

extending fork 36 in which is pivotally mounted a link 37. This link is extended between ears 38 projecting from a piston 39 mounted in one of the cylinders 19, the pivotal connection between link 37 and ears 38 being indicated at 40 while the pivotal connection between link 37 and fork 36 has been indicated at 41.

Obviously when motion is imparted to shaft 3, it will rotate within collar 28, this collar being held against rotation by studs 29, arms 30, rods 31, and the piston connections including blocks 34, forks 36 and links 37. Motion will be transmitted from shaft 3 to the small drive gear 4 and this, in turn, will transmit motion through the intermediate gear 5, to the ring gear 7. Consequently disk 8 and the support 13 mounted thereon will be rotated about shaft 3 and as the track 11 is pitched relative to its axis of rotation, the rotation of this track will cause the rods 31 to oscillate toward and from the cover plate 16.

The movement of the rods 31 toward plate 16 will be successive and the same is true of their movement away from said plate, it being understood that each rod 31 will move toward plate 16 during one-half the rotation of the track and move away from the plate during the other half of the rotation. The operation of the pistons 39 to place under compression air within the cylinders will thus take place successively and the same is true of the charging movements of the pistons. Consequently during one complete rotation of track 11 all of the pistons of the compressor will draw in a charge of air and expel the charge under pressure. Any number of pistons can be mounted on the plate 16, it merely being necessary to provide a number of rods 31

and cooperating parts equal to the number of cylinders used.

Housing 1 can be used as an oil container and the entire apparatus can thus operate smoothly and quietly without the vibration usually experienced where cranks are used for actuating the pistons. The mechanism is well balanced while in operation so that the tendency to vibrate is thus further reduced.

While the compressor is designed primarily for compressing air, it is to be understood that other gases or liquids could be compressed if desired.

What is claimed is:

A compressor including a housing, an annular series of cylinders supported on and opening downwardly into the housing and fixed relative thereto, a drive shaft journaled within the housing and rotatable about an axis parallel with the cylinders and equidistant therefrom, a rotatable casing within the housing, speed reduction means for transmitting motion from the shaft to the casing, a circular track inclined relative to the axis of rotation of but rotatable with the casing, said track including a channel extending continuously within the inner surface thereof, a collar mounted on the shaft, rods connected to the collar and mounted to swing in planes extending longitudinally of the shaft, rollers mounted on the rods and within the channel for moving engagement by the track, a block on each rod, said block being surrounded by the track, a piston in each cylinder, and a link connection between each piston and one of the blocks.

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