S. W. CALHOUN.

FLUID COMPRESSOR.

APPLICATION FILED AUG. 4, 1919.

1,413,388.

Patented Apr. 18, 1922.

2 SHEETS—SHEET 1.

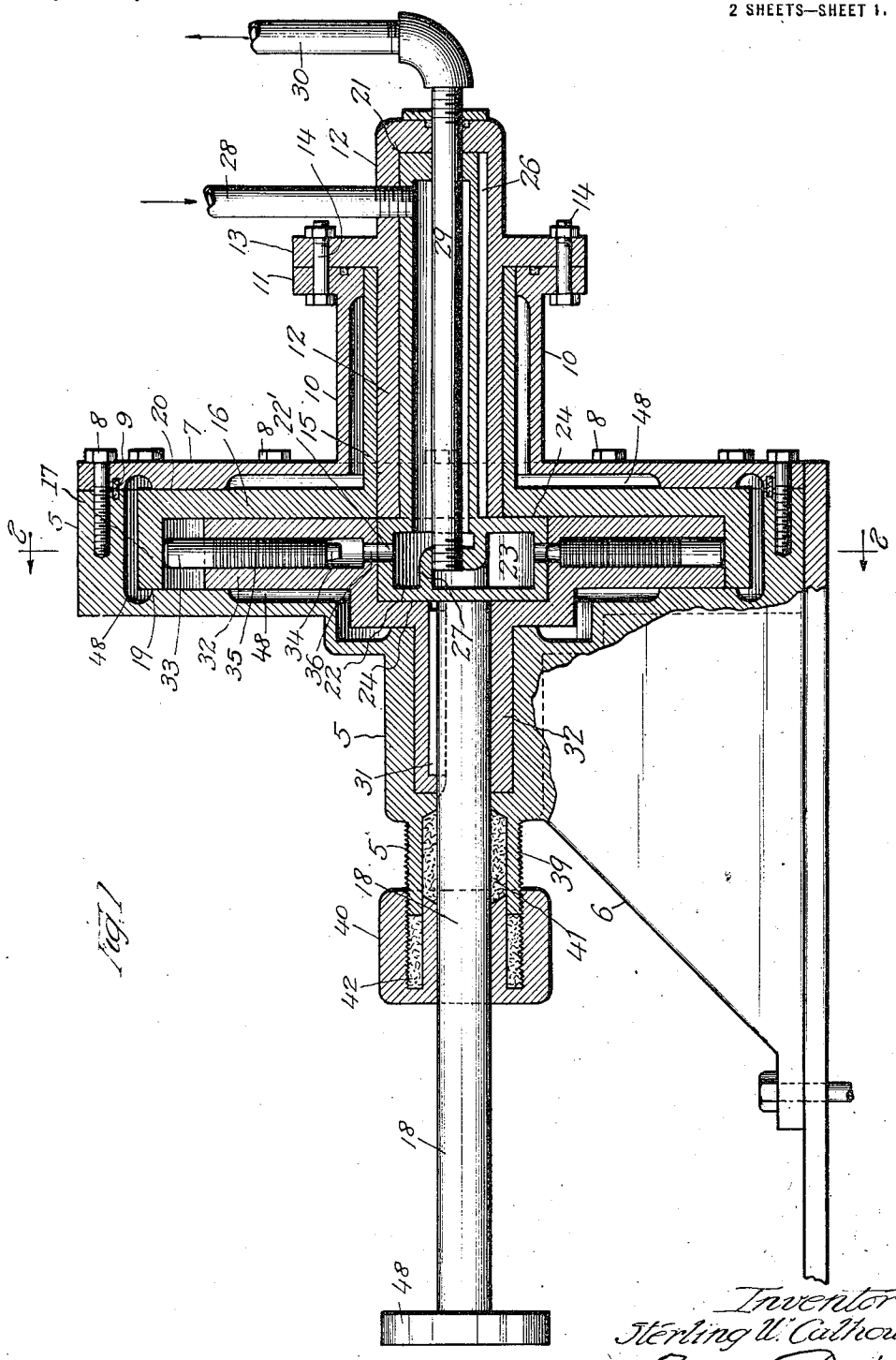



Fig. 1

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2 SHEETS—SHEET 2.

Fig. 2

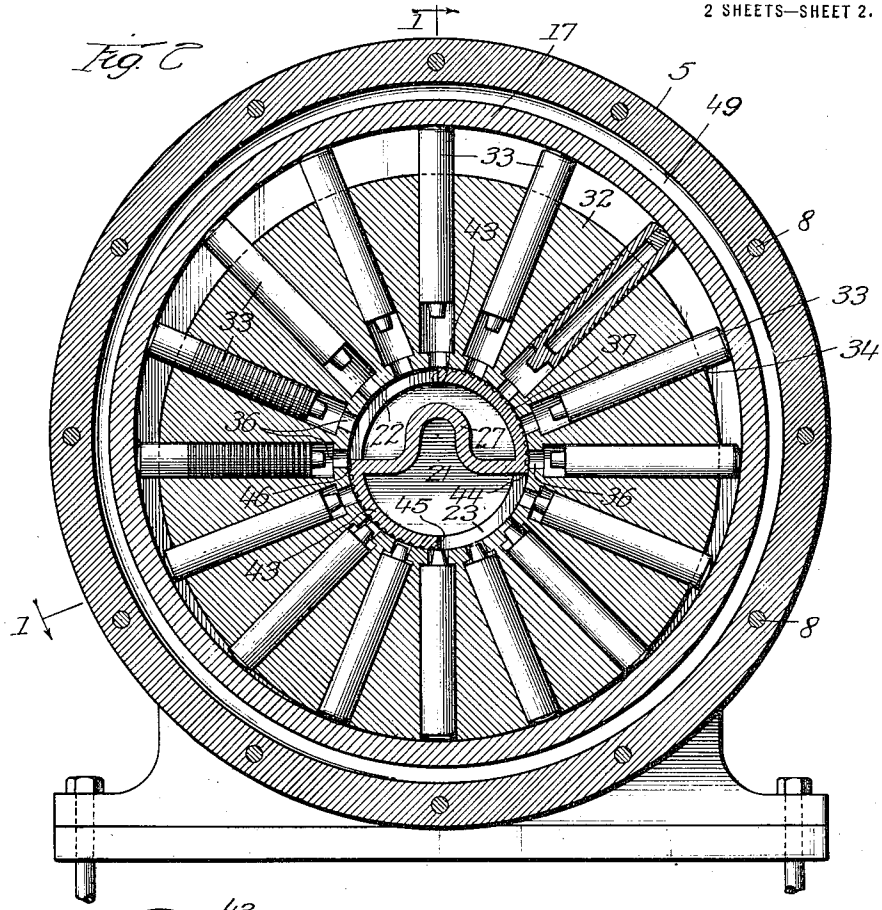
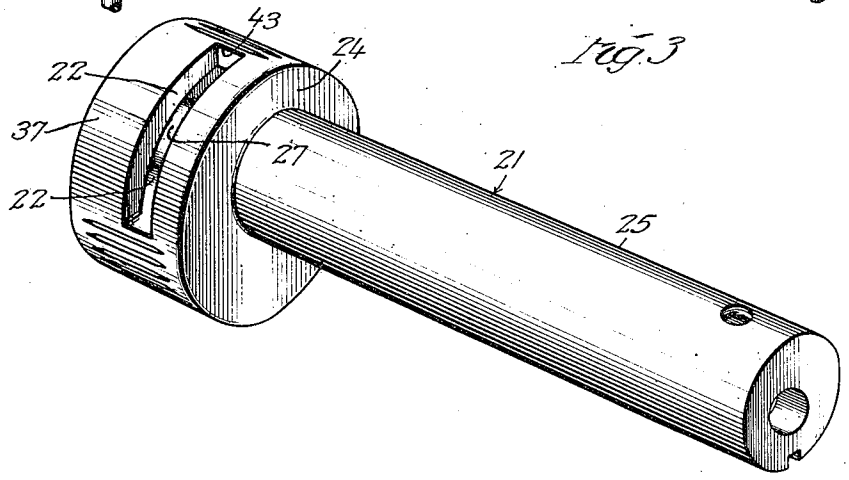



Fig. 3




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# UNITED STATES PATENT OFFICE.

STERLING W. CALHOUN, OF GLENCOE, ILLINOIS.

## FLUID COMPRESSOR.

1,413,388. Specification of Letters Patent. Patented Apr. 18, 1922.

Application filed August 4, 1919. Serial No. 315,042.

*To all whom it may concern:*

Be it known that I, STERLING W. CALHOUN, a citizen of the United States, residing at Glencoe, in the county of Cook and State of Illinois, have invented certain new and useful Improvements in Fluid Compressors, of which the following is a specification.

My invention relates to fluid compressors of the centripetal type.

One of the objects of the invention is to generally improve compressors by simplifying the structure to the end that all valves, connecting rods, crank shafts and piston packing rings are eliminated and consequently the cost of production is correspondingly reduced and certainty of operation enhanced.

Another object is to provide a compressor which will produce a substantially constant flow of fluid under pressure instead of periodic impulses usual in compressors in which a single cylinder and reciprocating piston are generally employed. The small increments at more frequent intervals are conducive of greater efficiency in operation and such action imposes less strain on the apparatus and the containers connected therewith.

In the cyclic operation of my compressor, there is no period of time when a larger quantity of fluid is being compressed than at some other period during its activity. Therefore there is a substantially steady flow of compressed fluid from the delivery end of the compressor and a relatively even constant flow of the fluid into the compressor.

Other, further and more specific objects of my invention will become readily apparent, to persons skilled in the art, from a consideration of the following description when taken in conjunction with the drawings, wherein:—

Fig. 1 is a section through the axis of the compressor, taken on line 1—1 of Fig. 2.

Fig. 2 is a transverse section taken on line 2—2 of Fig. 1.

Fig. 3 is a perspective view of a relatively stationary part containing the intake and delivery port of the compressor.

In all the views the same reference characters are employed to indicate similar parts.

In the drawings 5 is a portion of the housing frame supported on a pedestal 6, which may be an integral part thereof, and having a cover plate 7, secured thereto at intervals, by bolts 8. The interior of the frame is made substantially air tight by a packing ring 9, between the main body portion of the frame and the cover plate 7.

The cover plate 7 is also provided with a hub 10, having an outturned annular flange 11.

A sleeve member 12 fits inside of the hub 10 and is provided with a flange 13 for connection with the flange 11, by bolts 14. Extending from the flange 13, between the hub 10 and the sleeve 12, is a sleeve 15, expanded at its inner end into a disc 16, having an overhanging rim 17. This rim is eccentric to the axis of the driving shaft 18, but it is concentric with the casing 5. The rim member 17 is stationary and makes tight fit connection, as at 19, with the casing 5, and as at 20, with the cover plate 7. The port containing member 21 carries an inlet and outlet port 22 and 23, respectively, and is provided with a hub or head 24 and a hollow shaft portion 25. The hollow shaft part, 25, is concentric with the casing 5, while the head 24 is eccentric with the casing but concentric with the driving shaft 18. The member 21 is connected to the fixed sleeve 12 by a key way 26. The head 24 is provided with an internal wall 27, which divides the interior of the head into ports 22 and 23. The port 22 communicates with the interior of the hollow shaft 25 to which an inlet pipe 28 is connected, so that the inlet pipe 28 is in communication through the hollow shaft 25 with the port 22 at all times. The wall 27 is perforated for the introduction of the pipe 29, which is the delivery pipe, and which passes through the hollow shaft 25, into the port 23. The pipe 29 is connected to the delivery pipe 30, which leads to any suitable receptacle in which fluid under pressure is to be deposited. Secured to the shaft 18, by a key 31, is a rotatable, multiple cylinder 32, in disc shape, having a series of radially disposed pistons 33 therein, each piston preferably provided with a reduced end, as at 34, and having oil rings 35 in its peripheral surface. The pistons are relatively long so as to provide large resisting surfaces, and oil that will be accumulated in the rings 35 will afford sufficient packing to prevent leak past the pistons. Each cylinder is provided with a port 36 within which the reduced end 34 will

enter at the end of the instroke of the respective pistons, so as to provide the smallest possible amount of clearance for the fluid compressed by the radially moving pistons.

The head 24 is provided on its periphery with a series of oil grooves 37, shown rather exaggerated in size, within which to contain oil to increase the packing effect between the inner bore of the rotating member 32 and the outer surface of the head 24, similar to those in the pistons.

The part 5′, of the frame, is provided with threads 39 for a cap 40. The part 39 contains packing 41 and the cap 40 also contains packing 42. Now it is manifest that when the cap is screwed tightly on the threaded part 39 that leak past the shaft 18, when the latter is in rotation, is prohibited.

Now looking at Fig. 2, it will be observed that the pistons above a horizontal plane taken through the axis of the driving shaft, are to a greater or less extent moved outwardly from the axis of the driving shaft, their outward movement effected by centrifugal action, being limited only by the eccentric flange 17 against which the outer ends of each of the pistons bear. Now assuming that the member 32 is rotated in clockwise direction: the fluid taken in by them in their outward movements, through the port 22 and the pipe 28, is contained between the inner end of each of the pistons and the port 22′. As the cylinder member 32 is rotated, the pistons are moved inwardly by their contact with the inner surface of the eccentric flange 17, and at a point, substantially within a horizontal plane of the axis of the driving shaft, the discharge ports 36 of the cylinders are brought consecutively into communication with the port 23, which is in communication with the delivery pipes 29 and 30, and from which the fluid under compression is delivered.

So soon as the pistons have passed a vertical plane, taken through the axis of the driving shaft, their cylinders are substantially closed by the outer wall 43 of the head 24 and inner movement of the pistons, after passing this point, serves to compress the air within the respective cylinders.

After the cylinders in their progressive movement pass the point 46, the fluid in them is more or less attenuated by expansion, due to the outward movement of the pistons, whereupon the fluid within the port opening 22 will rush into the cylinder and fill the space and continue to do so until the pistons have arrived at substantially vertical position, whereupon, after passing vertical position, they begin to compress, and the cycle is repeated, as heretofore described.

The flange 48 is a means for connecting the driving shaft 18 to any suitable source of power.

While I have herein shown one embodiment of my invention, adapted for compressing a fluid, such as air, gas or the like, it will be manifest, to persons skilled in the art, that it is readily adaptable for the purpose of pumping liquids, such as water, or the like, with substantially the same attendant advantages. It is also manifest that the spaces 49 between the housing frame and working parts of the apparatus may be filled with circulating water for cooling the parts, if desired, and there are other modifications and additions that will readily suggest themselves to persons skilled in the art, and while I have herein shown a single embodiment of the invention for the purpose of clear disclosure, it is apparent that considerable change in the configuration and the arrangement of the parts is within the scope of the appended claim.

Having described my invention, what I claim is:—

A compressor having in combination a rotatable cylinder member provided with a plurality of radially disposed cylinders therein, each cylinder at its inner end having a bore of contracted diameter communicating with a central bore in said member; a piston in each cylinder having two diameters to fill the bores of the respective cylinder to reduce the clearance at the inner ends of the cylinder; a hollow fixed member in the bore of the rotary member having a pair of oppositely positioned ninety degree ports for communication with the cylinders in progress of rotation and a fixed ring eccentric to the axis of the cylinder member, to force the pistons into their cylinders and to permit their outward movement at different points of rotation whereby all of the air is gradually forced out of each cylinder during one fourth of a complete rotation and the cylinder is completely exhausted when the piston occupies its most inward position.

In testimony whereof I hereunto subscribe my name.

STERLING W. CALHOUN.