Dec. 20, 1955 D. PICA 2,727,679

FLUID COMPRESSORS

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Fig. 1.

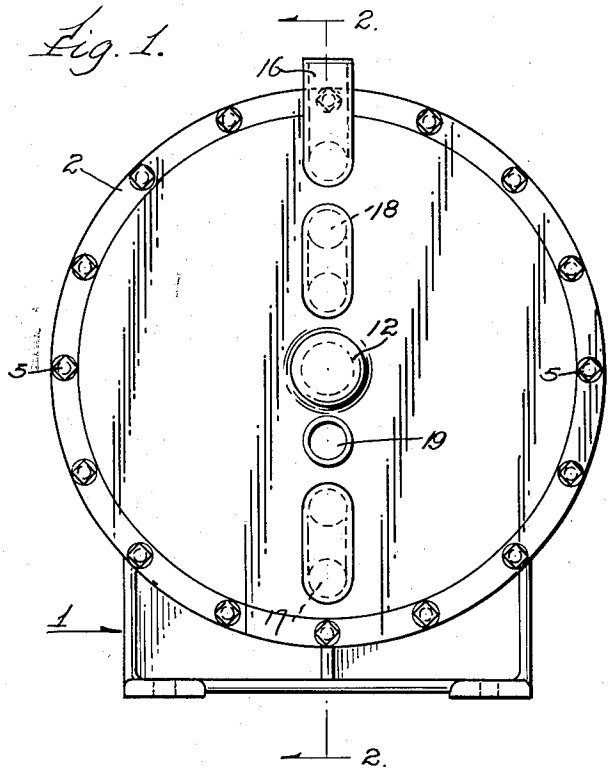


Fig. 2.

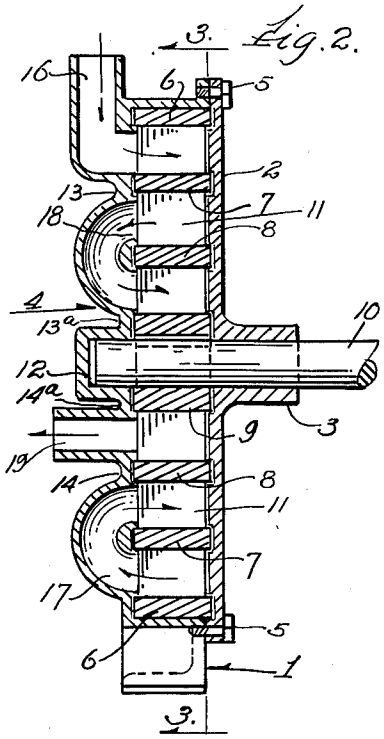


Fig. 3.

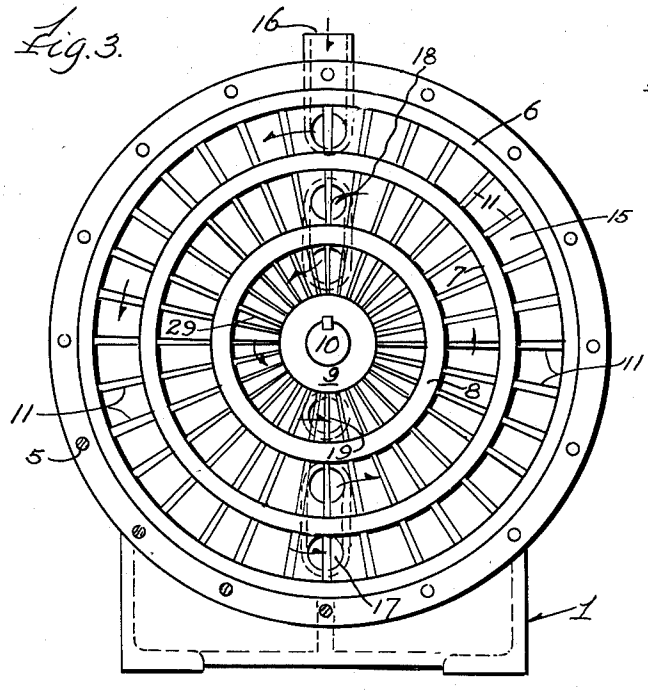
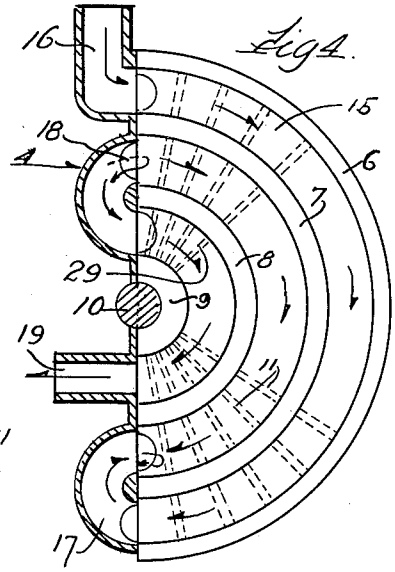


Fig 4.



INVENTOR.
Daniel Pica.
BY H. J. Sanders
Attorney.

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Fig. 5.

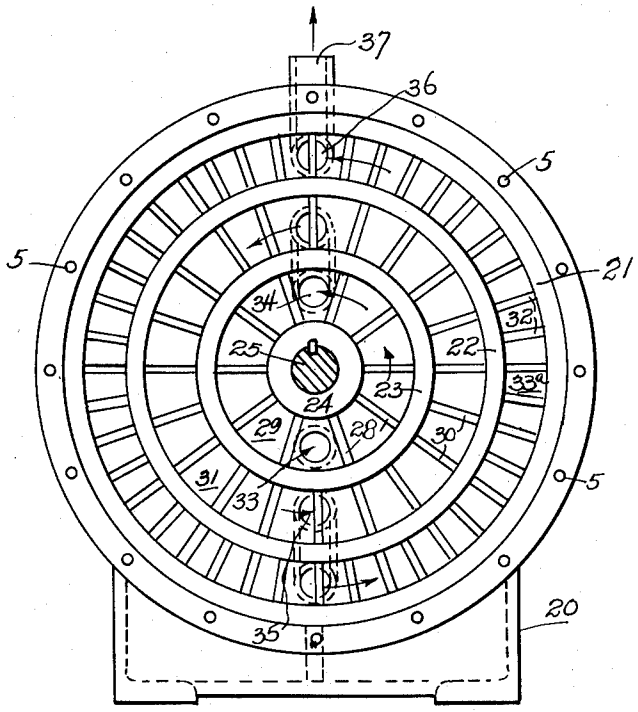
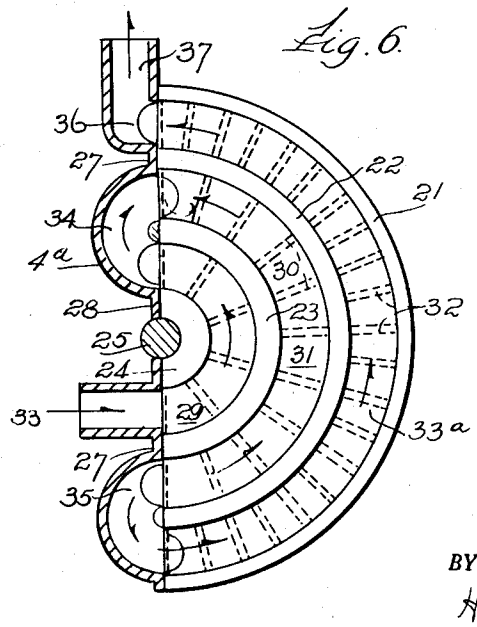


Fig. 6.



INVENTOR.
Daniel Pica.
BY
H. J. Sanders
Attorney.

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2,727,679

FLUID COMPRESSORS

Daniel Pica, Chicago, Ill., assignor of one-half to Frank Kemptner, Silver Lake, Wis.

Application January 19, 1954, Serial No. 404,919
1 Claim. (Cl. 230—124)

This invention relates to fluid compressors and more particularly to a one-wheel or single rotor, three-stage compressor for use to compress a fluid for any purpose. One object is to provide efficient turbine and compressor apparatus of compact structure and simple mechanical assembly that is powerful in operation, durable in use and inexpensive to manufacture.

A further object is to provide a multi-stage turbine and compressor of good aerodynamic efficiency. With the foregoing and other objects in view the invention will be understood from the following specification, defined in the claim and illustrated in the accompanying drawing forming part of this disclosure.

In the drawing:

Fig. 1 is a view in rear elevation of a turbine and compressor apparatus according to the invention.

Fig. 2 is an approximately central vertical sectional view through Fig. 1 on the line 2—2.

Fig. 3 is a vertical sectional view through Fig. 2 on the line 3—3, with the bearing plate removed.

Fig. 4 is a view partly in section and partly diagrammatic showing particularly the paths of travel of the fluid.

Fig. 5 is a view of a modified form, and,

Fig. 6 is a view partly in section and partly diagrammatic, of same.

Referring now to Figs. 1 through 4, the instant turbine and compressor, of centripetal type, includes a supporting stand or frame 1 that carries the apparatus proper which consists of a circular bearing plate or stator 2 having the central hub 3, the stator having the plate 4 secured thereto by bolts or rivets 5, defining a housing. Operatively arranged upon said stator 2 is the outer annular rib 6, the intermediate annular rib 7 and the inner annular rib 8, said ribs being concentric and spaced equal distances from each other consecutively, a hub 9 spaced from the inner rib 8 being aligned with the stator hub 3 and keyed to the rotary shaft 10 driven by a suitable motor (not shown).

Connecting the annular ribs to each other and to the hub 9 are the vanes 11 of the same depth as said ribs. The contour of the housing includes a bearing 12 for the inner end of the shaft 10, said housing also having recessed inwardly disposed portions 13, 13*a* and 14, 14*a*; the portions 13, 14 being in fluid-tight relation with the ribs 7 and 8 respectively and the portions 13*a*, 14*a* in like relation with the hub 9, the ribs 6, 7, 8 with hub 9, stator 2, and vanes 11 defining buckets 15, the latter arranged between the hub 9 and rib 8 and between the several ribs.

The vanes 11 are radially arranged so that the buckets 15 between the ribs 6 and 7 forming the first stage are larger than those between the ribs 7 and 8 forming the second stage, which buckets, in turn, are larger than the buckets between the ribs 8 and hub 9, which buckets comprise the third stage, the intake desirably located at the top portion of the housing and receiving fluid under pressure from a source.

At a point 180 degrees from the intake conduit a conduit 17 communicating with the first and second stage buckets between ribs 7 and 8 that form the second stage, the conduit tapering somewhat from its point of communication with the first stage buckets 15, toward buckets 15 of the second stage between ribs 8 and hub 9. The fluid path is denoted by arrows in Figs. 2, 3 and 4. At a point 180

degrees removed from the point of fluid entry to the second stage that stage is provided with a discharge conduit 18 communicating with the buckets of the third stage between ribs 8 and hub 9, the conduit 18 tapering as it recedes from the second stage, the fluid from the third stage passing therefrom through the discharge outlet 19.

Referring now to Figs. 5 and 6 a turbine and compressor of the centrifugal type is shown which includes a supporting stand 20 to which a circular plate or stator similar to the stator 2 of Figs. 1 and 2 is secured by bolts or rivets 5 that also secure the stator to the plate 4. Defined by plate 4*a* and stator 2 is a housing within which is the outer annular rib 21, the intermediate annular rib 22 and the inner annular rib 23, said ribs operatively arranged upon said stator, said ribs being concentric and spaced equal distances from each other consecutively, a hub 24 spaced from the inner rib 23 being aligned with the stator hub and keyed to the rotary shaft 25 driven by the motor (not shown), the shaft 25 being that receiving the stator.

The contour of the housing includes a bearing for the inner end of rotary shaft 25, said housing also having recessed inwardly disposed portions 27 that in conjunction with ribs 21, 22, 23 define fluid passageways.

Connecting the hub 24 to the rib 23 are the radial vanes 28 defining large buckets 29 while connecting rib 23 with rib 22 are the vanes 30, in number twice that of the vanes 28 defining buckets 31 which therefore are materially smaller than the buckets 29, and connecting the rib 22 to the rib 21 are the vanes 32, in number twice that of the vanes 30, defining buckets 33*a* substantially smaller than the buckets 31.

The plate 4*a* is here formed with an intake 33 receiving fluid under pressure from a source, the fluid following the path denoted by the arrows, Fig. 6, filling the buckets 29, which are the first stage buckets, and actuating the rotor, the fluid passing from these buckets through the conduits 34 into the buckets 31, increasing the pressure due to the small size of the buckets, the buckets 31 being second stage buckets, the fluid passing therefrom through conduit 35 into the buckets 33*a* under increased pressure and forming the third stage buckets, the fluid passing therefrom through conduit 36 and discharged at point 37, the discharge point being substantially 180 degrees from the intake point. In operation, the buckets in the largest and outermost circle rotate at greatest velocity.

What is claimed is:

In a fluid compressor, a housing including a stator, a rotary drive shaft mounted in said housing, a hub keyed to said shaft, spaced annular concentric ribs arranged about said shaft, vanes connecting said hub to the innermost rib, vanes connecting said innermost rib to the adjacent rib, vanes connecting said last rib to the outermost rib, the spaces between vanes of each group being progressively smaller from said hub to said outermost rib defining buckets, a fluid intake communicating with the innermost buckets, a conduit connecting the said innermost buckets to adjacent buckets, a conduit connecting said last named adjacent buckets to the outermost buckets, and an outlet for said outermost buckets, all of said conduits disposed in a plane common to that of said outlet, said inlet disposed in a plane at right angles to the aforesaid plane, each of said conduits tapered from its innermost extremity to its outermost to lessen fluid back pressure.

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