May 31, 1949. J. NEUROTH 2,471,579

AIR OPERATED ACTUATOR

Filed June 7, 1945

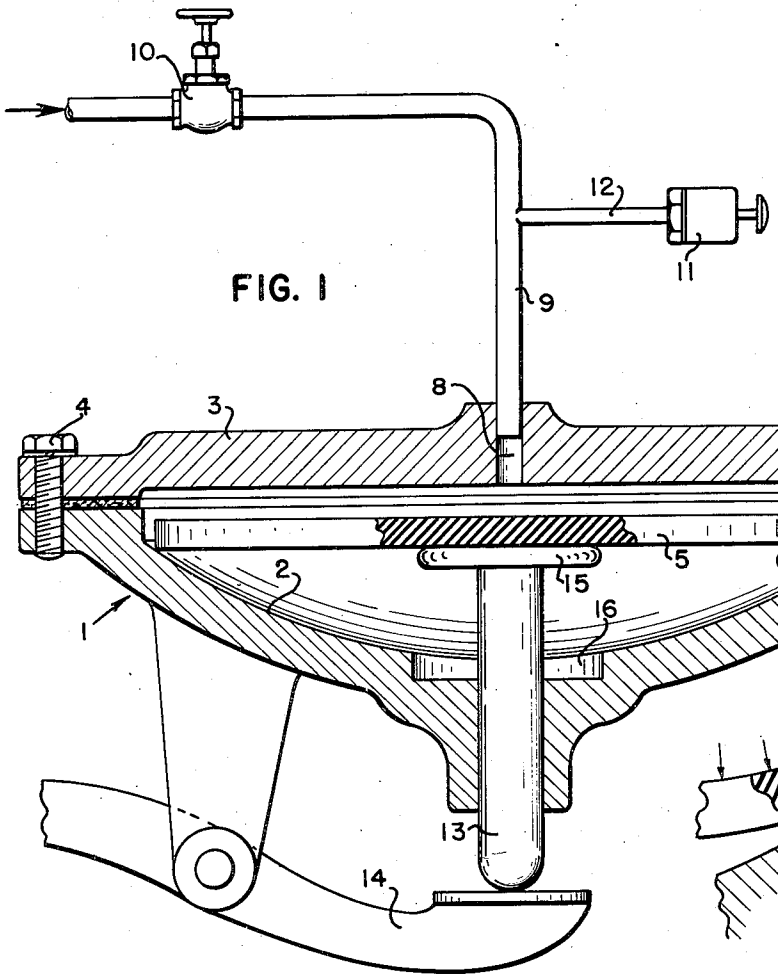


FIG. 1

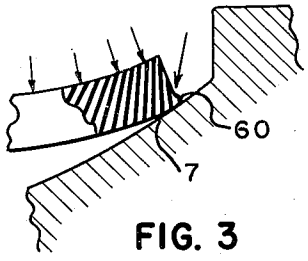


FIG. 3

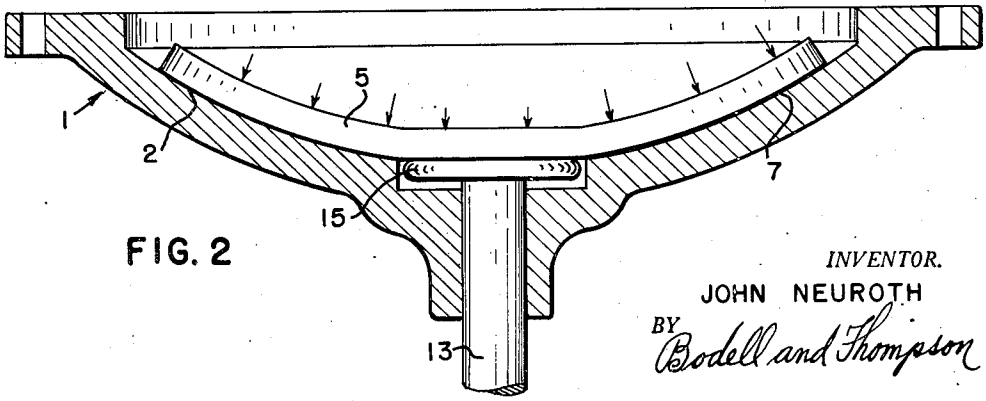


FIG. 2

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AIR OPERATED ACTUATOR

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1 Claim. (Cl. 137—157)

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This invention relates to motive fluid or air operated actuators or motors used in such situations where diaphragms, pistons, etc. are used, and has for its object a piston, which is a flexible disk free or not bound at its peripheral edge, and hence free of any strains tending to crack it during its flexing action, and in which the distortion or flexing is distributed throughout approximately its entire area or the greater part of its area.

The invention consists in the novel features and in the combinations and constructions hereinafter set forth and claimed.

In describing this invention, reference is had to the accompanying drawings, in which like characters designate corresponding parts in all the views.

Figure 1 is a sectional view of a motor or actuator embodying this invention showing the piston or disk in its normal position.

Figure 2 is a view of parts seen in Figure 1 showing the flexing of the disk, when the piston is in its operated position under pressure.

Figure 3 is an enlarged fragmentary detail view illustrating the coaction of the piston or disk with the concave wall of the piston chamber, when air pressure is first applied to the disk on the pressure side thereof.

The invention is here illustrated in its simplest form showing the structure of the piston and its operation.

1 designates a pressure chamber having a concave wall 2 on one side thereof, this chamber being provided with a removable section or cover 3 secured in position, as by screws 4, the wall of section 3 being opposed to the concave wall 2.

5 designates the piston or disk, this being of a resilient yielding and flexible material, as rubber. The chamber is in the general form of a diaphragm chamber but the disk 5 is not secured to the chamber at its margin. When pressure is applied to the disk on the face thereof opposite to the face opposed to the concave wall 2, the disk convexes or bulges to conform to the concave wall. Normally, or at the start, the corner 6 of the peripheral disk between its edge, which is preferably cylindrical, and its face opposed to the concave face 2, is in contact with, or just short of, contact with the face 2, and when the pressure is applied to the disk, the corner first distorts as at 60 (Figure 3), and as the pressure continues to be applied, the margin of the disk comes in sealing contact, as at 7, with the concave surface 2 and finally nearly all of the surface of the disk conforms to and

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seals against the concave face 2, as seen in Figure 2.

The chamber 2 or the wall 3 thereof is provided with a combined inlet and exhaust port 8 for compressed air, this port communicating with a conduit 9 having an operating valve 10 therein of any suitable construction. The means for operating the valve forms no part of the invention. A release valve 11 is connected to the chamber or the port 8 through a pipe 12 and the conduit 9. When the valve 10 is closed and the release valve 11 opened, air will exhaust from the chamber 3 and permit the disk 2 to return from its position shown in Figure 2 to the flat normal position shown in Figure 1. Upon the initial opening of the valve 11, the blast of air acting on the disk 5 will immediately bring the corner 6 up against the concave face 2 in case it is spaced slightly therefrom.

The motion of the disk is transferred through a plunger 13 arranged coaxial with the disk and slidable through the portion of the casing 1 formed with the concave wall 2, to the outside thereof, where it coacts with a motion transmitting member 14. The work performed by the motion transmitting member 14 is of no importance in so far as this invention is concerned. It may, however, operate a valve or any other part to be operated. The plunger 13 thrusts against the central portion of the disk and may, if desired, be secured thereto. Preferably, the wall 2 of the chamber is formed with a depression or countersink 16 for receiving the head 15 when the piston or disk 5 has been actuated to its full extent, as shown in Figure 2. It is here shown as connected to the motion transmitting member 14 to oppose actuation by the disk.

The flexible, yielding, resilient disk coacting with the concave face of the piston chamber provides a tight seal without packing, permits the disk to be free or not secured or bound at its margin, and further provides a piston which does not have sliding contact at its periphery.

By reason of this piston, the disadvantages of other types of pistons in certain situations are avoided as well as the cracking that develops in diaphragm types of actuators, and further this flexible, resilient, yielding disk type of piston is more economical to manufacture and install, and is longer lived than the sliding and diaphragm types.

What I claim is:

An air operated motor or actuator comprising a chamber having a concave wall, a piston having a cylindrical wall in the chamber opposed

to the concave wall, the piston being a flexible resilient disk free of the walls of the chamber and initially engaging at the most the concave wall at the corner only of the cylindrical wall of the disk and the face thereof opposed to the concave face of the chamber, and conforming at the margin thereof with the concave wall when pressure is applied to the disk on the side thereof opposite to that exposed to the concave wall, and means for transmitting the flexing movement of the disk.

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REFERENCES CITED

The following references are of record in the file of this patent:

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