

J. JOHNSTON.
 ROTARY COMPRESSOR OR EXHAUSTER.
 APPLICATION FILED JUNE 22, 1915.

1,233,581.

Patented July 17, 1917.
 2 SHEETS—SHEET 1.

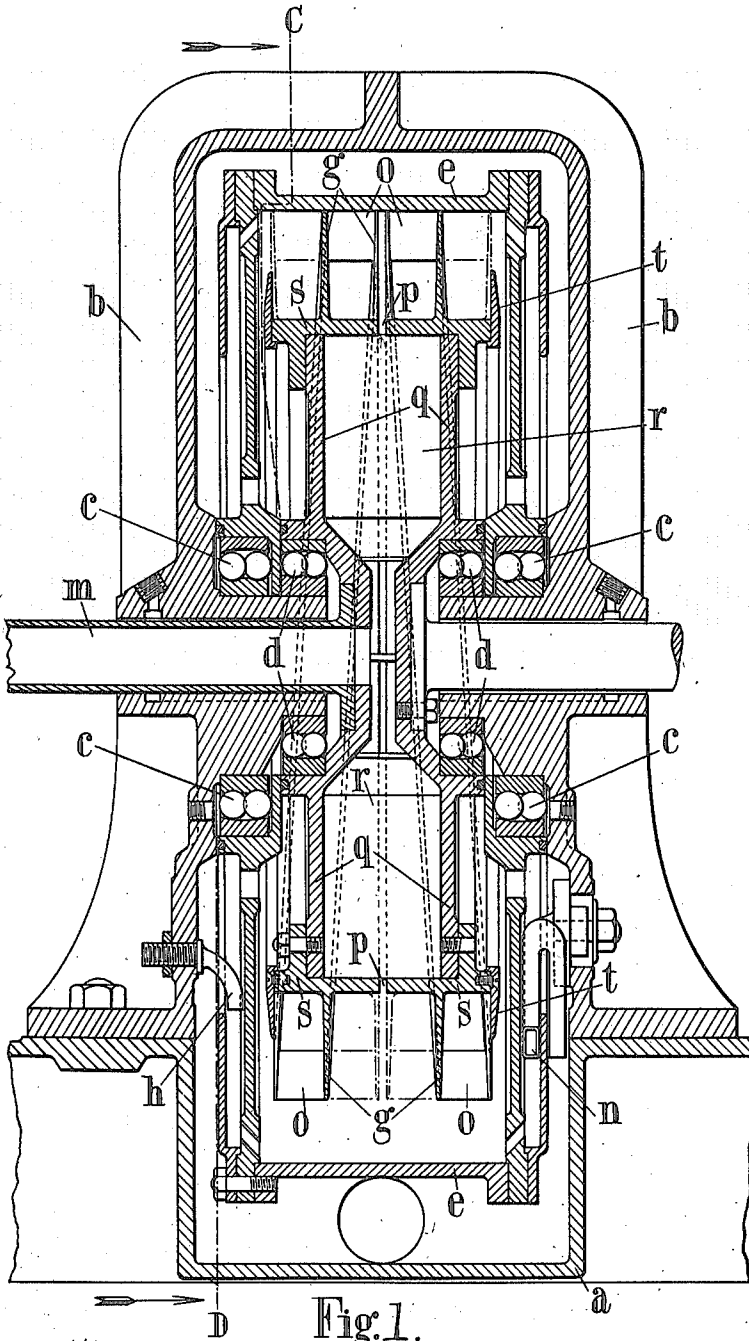


Fig. 1.

Witnesses:

E. D. Smith
R. I. Hulsizer

Inventor:

John Johnston
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 Attorneys.

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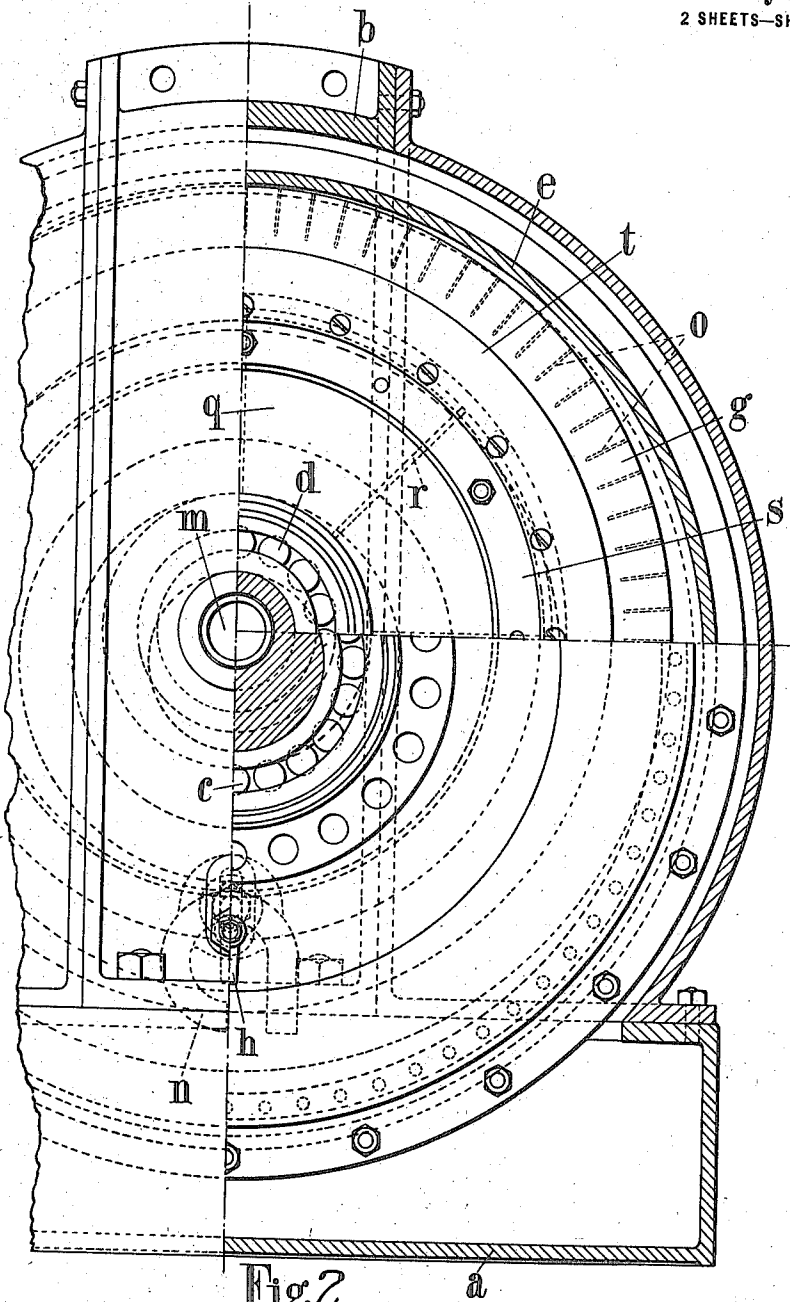


Fig. 2.

Witnesses:

E. Daniels.
R. J. Hulsizer.

Inventor:

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UNITED STATES PATENT OFFICE.

JOHN JOHNSTON, OF LONDON, ENGLAND.

ROTARY COMPRESSOR OR EXHAUSTER.

1,233,581.

Specification of Letters Patent.

Patented July 17, 1917.

Application filed June 22, 1915. Serial No. 35,547.

To all whom it may concern:

Be it known that I, JOHN JOHNSTON, a subject of the King of Great Britain and Ireland, and residing at 1 Victoria street, London, England, have invented a certain new and useful Improved Rotary Compressor or Exhauster, of which the following is a specification.

This invention relates to an improved rotary compressor or exhauster of the type comprising two drum-like members arranged one within the other and eccentrically to one another and having an annular liquid piston occupying the space between the members, the inner of said members being provided with one or more helical passages through which the air or other gas being operated upon is forced from the inlet to the outlet side of the machine. In such devices it is well known that the degree of compression or exhaustion depends upon the amount of centrifugal force available for such operations in the liquid of the annular piston, this being determined for a given speed of rotation by the extent of the immersion in the liquid of the helical passage or passages.

It has heretofore been proposed to increase the effectiveness of the machine by making the inner member tapered or conical in such a manner as to increase the depth of immersion in the liquid of the helical passage through which the gas passes, but such a construction suffers from the grave disadvantage that a wedging action takes place between the tapered member and the liquid with the result that the outer casing is often subject to very great stresses and may be liable to burst.

The object of the present invention is to devise an improved form of machine of the kind first above referred to having the advantages of the second type of apparatus mentioned without its attendant disadvantages, and the invention consists in a compressor or exhauster of the type first above referred to comprising in combination an outer casing, an inner cylindrical rotary member having one or more helical passages thereon and a shrouding plate formed or fitted upon one or each side of the inner member.

The invention also comprises means for maintaining constant the amount of liquid within the machine.

The invention still further comprises the

particular form of machine hereinafter described with reference to the accompanying drawings in which:—

Figure 1 is a transverse sectional elevation illustrating one convenient form of machine in accordance with the invention applicable more particularly as an exhauster.

Fig. 2 is a view illustrating partly in end elevation and partly in sectional elevation on the line C—D the machine illustrated in Fig. 1.

In carrying my invention into effect in one convenient manner as illustrated in its application to an exhauster, I provide any suitable form of framework or foundation *a* for the machine having brackets *b* thereon for carrying the bearings *c*, *d* of the outer and inner members respectively (when both are to be rotated) the bearings being disposed symmetrically about the center line of the machine as shown or being arranged so that the members may be overhung or in any other suitable manner. The outer member *e* is as is usual in the form of a hollow drum or casing and the inner member is cylindrical in form and in the particular construction illustrated is constructed in two parts *g* each of which is provided with two threads *g*, the threads in the one case being right-handed and in the other case left-handed so that the air or gas to be extracted by the machine will be drawn through the hollow shaft *m* by way of the interior of the inner member and through the apertures *p* to be fed along the inner member to the outer surfaces thereof.

The two parts *g* of the inner member are connected by intermediate webs *r* and the outer ring-like portions *s* carrying the threads *g* are bolted or otherwise secured to the members *g* and in order to provide for an increased effectiveness of the machine as regards the degree of exhaustion or compression obtainable therefrom I provide shrouding plates *t* on each side of the inner member which, as is stated, is cylindrical in form so that the shrouding plates will provide for an increased immersion of the inlet or outlet for the air or gas in the liquid of the annular piston, thus causing the gas to be acted upon by an increased centrifugal force and increasing the degree of exhaustion or compression obtainable.

The shrouding plates are conveniently made somewhat shorter than the stroke of

the machine in order to leave a discharge passage between their edge and the liquid piston at the outer part of the stroke.

The water or other liquid that is to form the annular piston may be introduced into the space between the two members by the nozzle *h* and suitable means may be adopted for maintaining constant the amount of liquid within the machine as, for example, I may provide an outlet scoop *n* for this purpose, the scoop being pivotally mounted or otherwise suitably arranged so that its position may be readily varied depending upon the quantity of liquid that is to be maintained within the machine.

The spiral vanes or blades *g* may be formed in one with the inner drum-like member or they may be suitably secured thereto in any convenient manner and for the purpose of rotating the annular liquid piston between the members I prefer to provide the thread or threads with a series of intermediate transverse vanes or paddles *o* which may be secured in slots in the threads or in any other suitable manner.

For certain purposes it may be found advantageous to arrange the inner drum to run free while the outer drum is adapted to be power-driven or the converse arrangement may be adopted in which the inner drum is power-driven and the outer drum allowed to run free, or for some purposes the outer drum may even be fixed, and it will be understood that in general a machine constructed in accordance with this invention may be adapted to work either as a compressor or as an exhaustor depending upon its direction of rotation.

It is to be understood that I do not desire to confine my invention to the particular construction of inner and outer members hereinbefore referred to provided always that the inner member is of substantially cylindrical form and provided with a shrouding plate or plates, and I suitably modify the size and arrangement of the different parts to suit the purpose for which the device is to be employed, varying also the materials from which the various parts are constructed.

Having now described my invention what I claim as new and desire to secure by Letters Patent is:—

1. A rotary compressor or exhaustor comprising in combination an outer rotary member, an inner rotary member eccentric thereto and formed with a helical passage, a centrifugally held body of liquid between said members and a shrouding plate upon one side face of the inner member.

2. A rotary compressor or exhaustor comprising in combination an outer rotary member, an inner rotary member eccentric thereto and formed with a helical passage, a centrifugally held body of liquid between

said members and a shrouding plate upon each side face of the inner member.

3. A rotary compressor or exhaustor comprising in combination an outer rotary member, an inner rotary member eccentric thereto and formed with a helical passage, means for admitting liquid into the space between said members, a shrouding plate upon one side face of said inner member and means for maintaining substantially constant the amount of liquid between said members.

4. A rotary compressor or exhaustor comprising in combination an outer rotary member, an inner rotary member eccentric thereto and formed with a helical passage, means for admitting liquid into the space between said members, a shrouding plate upon each side face of said inner member and means for maintaining substantially constant the amount of liquid between said members.

5. A rotary compressor or exhaustor comprising an outer rotary member, an inner rotary member arranged eccentrically to said outer member, a helical vane upon said inner member, means for supplying liquid to the space between said members and a shrouding plate upon one side face of said inner member.

6. A rotary compressor or exhaustor comprising an outer rotary member, an inner rotary member arranged eccentrically to said outer member, a helical vane upon said inner member, means for supplying liquid to the space between said members and a shrouding plate on each side face of said inner member.

7. A rotary compressor or exhaustor comprising an outer rotary member, an inner rotary member formed in two parts inclosing a chamber or hollow space between said parts and having communication with the outer surface of the inner member, two oppositely disposed helical vanes upon said inner member, a centrifugally held body of liquid between said members, means for driving said inner member and a shrouding plate upon each side face of said inner member.

8. A rotary compressor or exhaustor comprising an outer rotary member, an inner rotary member formed in two parts inclosing a chamber or hollow space between said parts and having communication with the outer surface of the inner member, two oppositely disposed helical vanes upon said inner member, means for supplying liquid to the space between said members, a shrouding plate upon each side face of said inner member and means for maintaining substantially constant the amount of liquid between said members.

9. A rotary compressor or exhaustor comprising an outer rotary member, an inner

rotary member arranged eccentrically there-
to, two oppositely disposed helical vanes
upon said inner member, a hollow shaft car-
rying said member and communicating with
5 a chamber formed within said inner mem-
ber, means for driving said inner member, a
shrouding plate upon each side face of said
inner member and a centrifugally held body
of liquid between said members.
10 10. A rotary compressor or exhauster com-
prising an outer rotary member, an inner
rotary member arranged eccentrically there-
to, two oppositely disposed helical vanes
upon said inner member, a hollow shaft car-
rying said member and communicating with
15 a chamber formed within said inner mem-
ber, means for driving said inner member,
means for supplying liquid to the space be-
tween said members, means for maintaining
20 substantially constant the amount of liquid
within the machine, a shrouding plate upon

each side face of said inner member, and a
centrifugally held body of liquid between
said members.

11. A rotary compressor or exhauster com- 25
prising an outer rotary member, an inner
rotary member arranged eccentrically there-
to, two oppositely disposed helical vanes
upon said inner member, a hollow shaft
carrying said member and communicating 30
with a chamber formed within said inner
member, means for driving said inner mem-
ber, means for supplying liquid to the
space between said members, an adjustable
scoop for maintaining substantially constant 35
the amount of liquid within the machine, a
shrouding plate upon each side face of said
inner member, and a centrifugally held body
of liquid between said members.

In testimony whereof I have signed my 40
name to this specification.

JOHN JOHNSTON.