A. C. ROESSLER.

ROTARY COMPRESSOR.

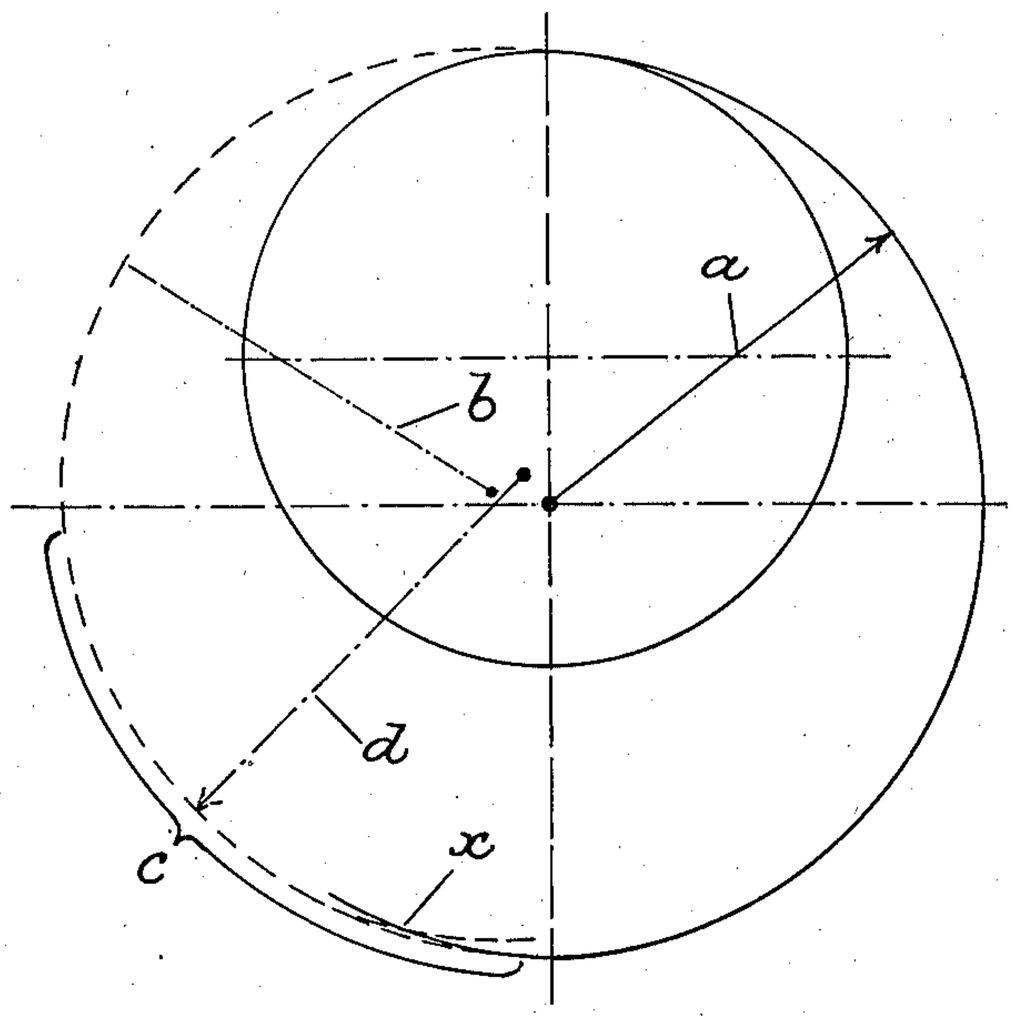
APPLICATION FILED MAY 2, 1908.

986,502.

Patented Mar. 14, 1911.

3 SHEETS—SHEET 1.

FIG. 1.



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3 SHEETS—SHEET 2.

FIG. 4.

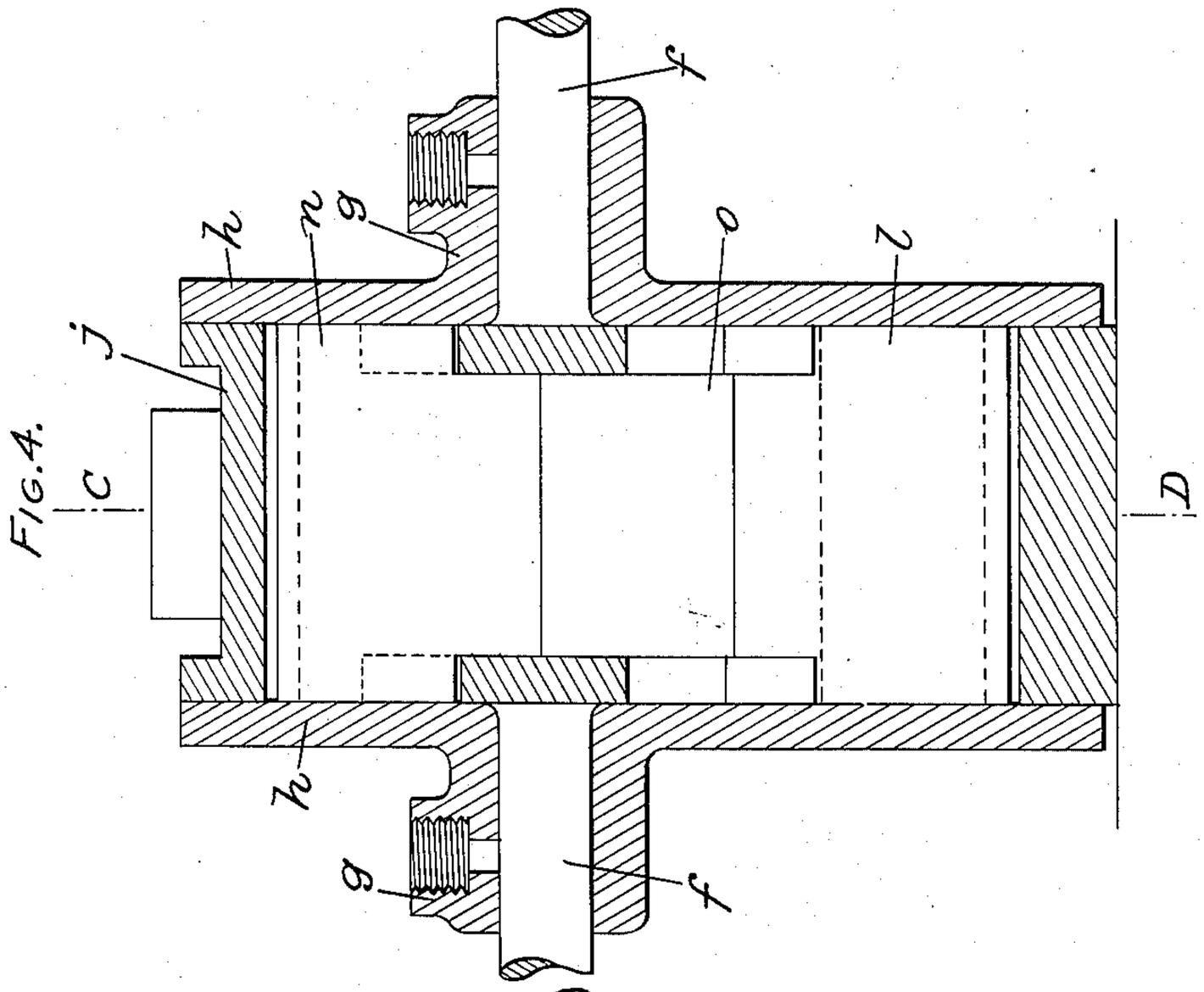
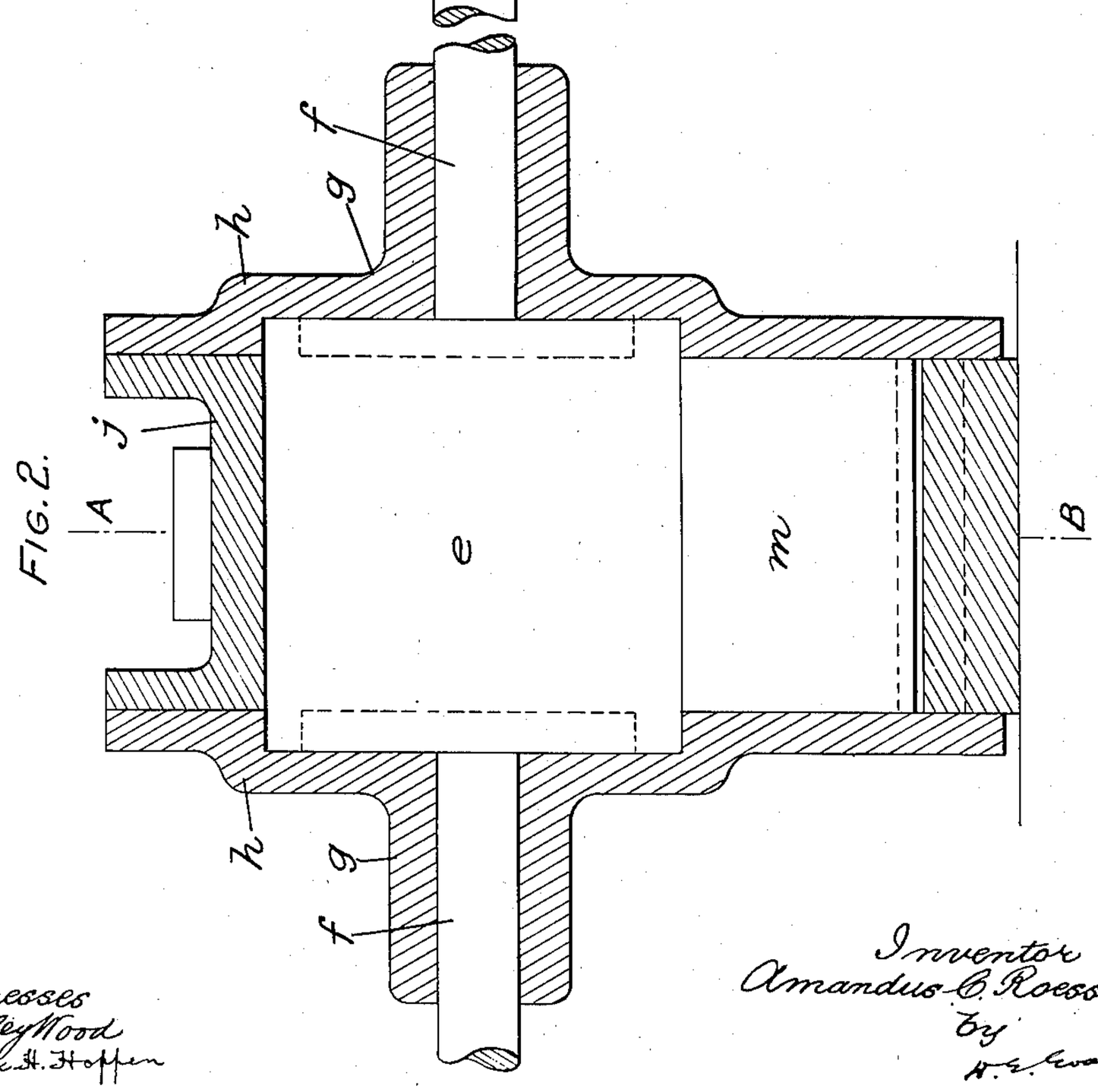


FIG. 2.



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3 SHEETS—SHEET 3.

FIG. 3.

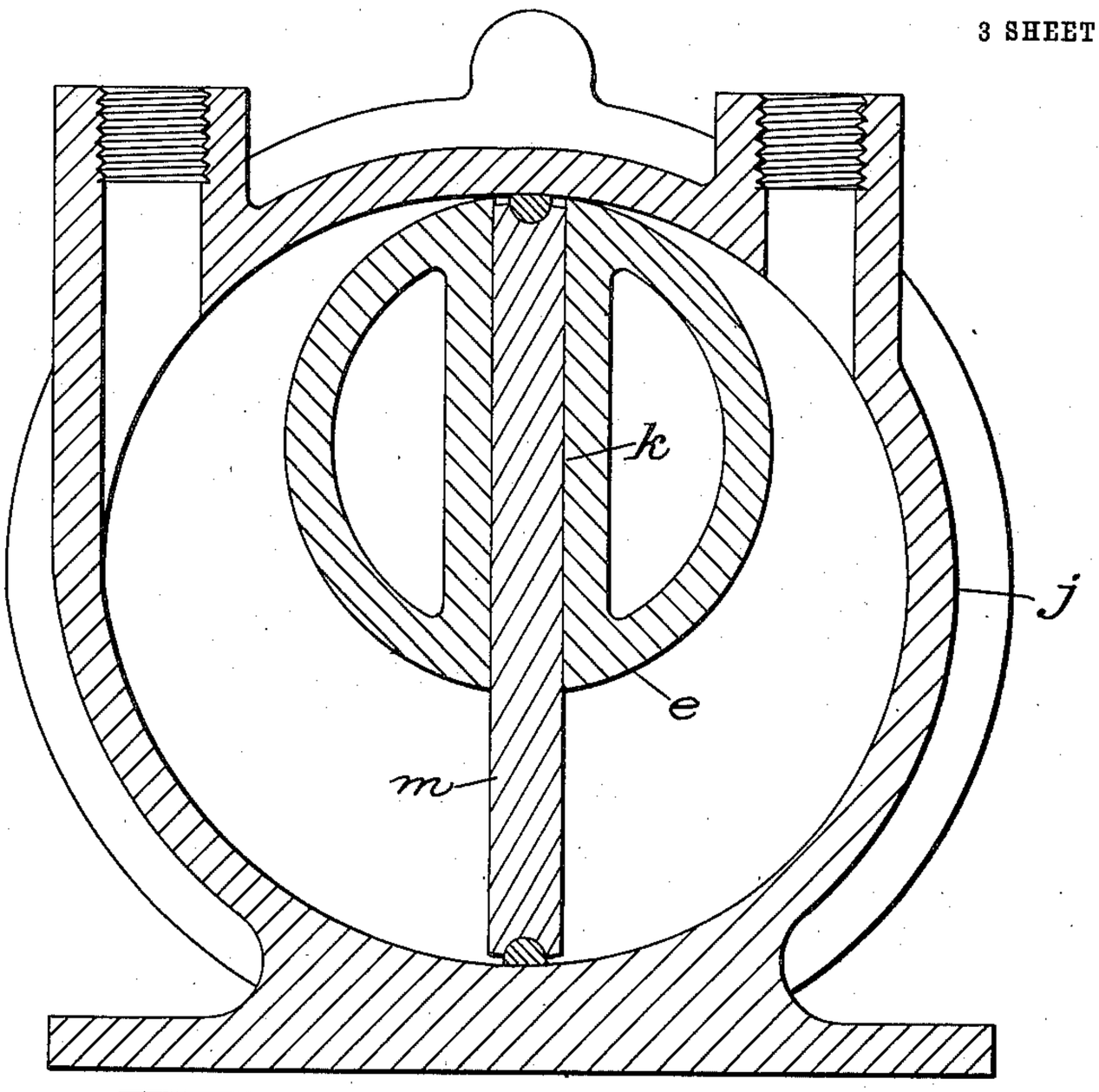
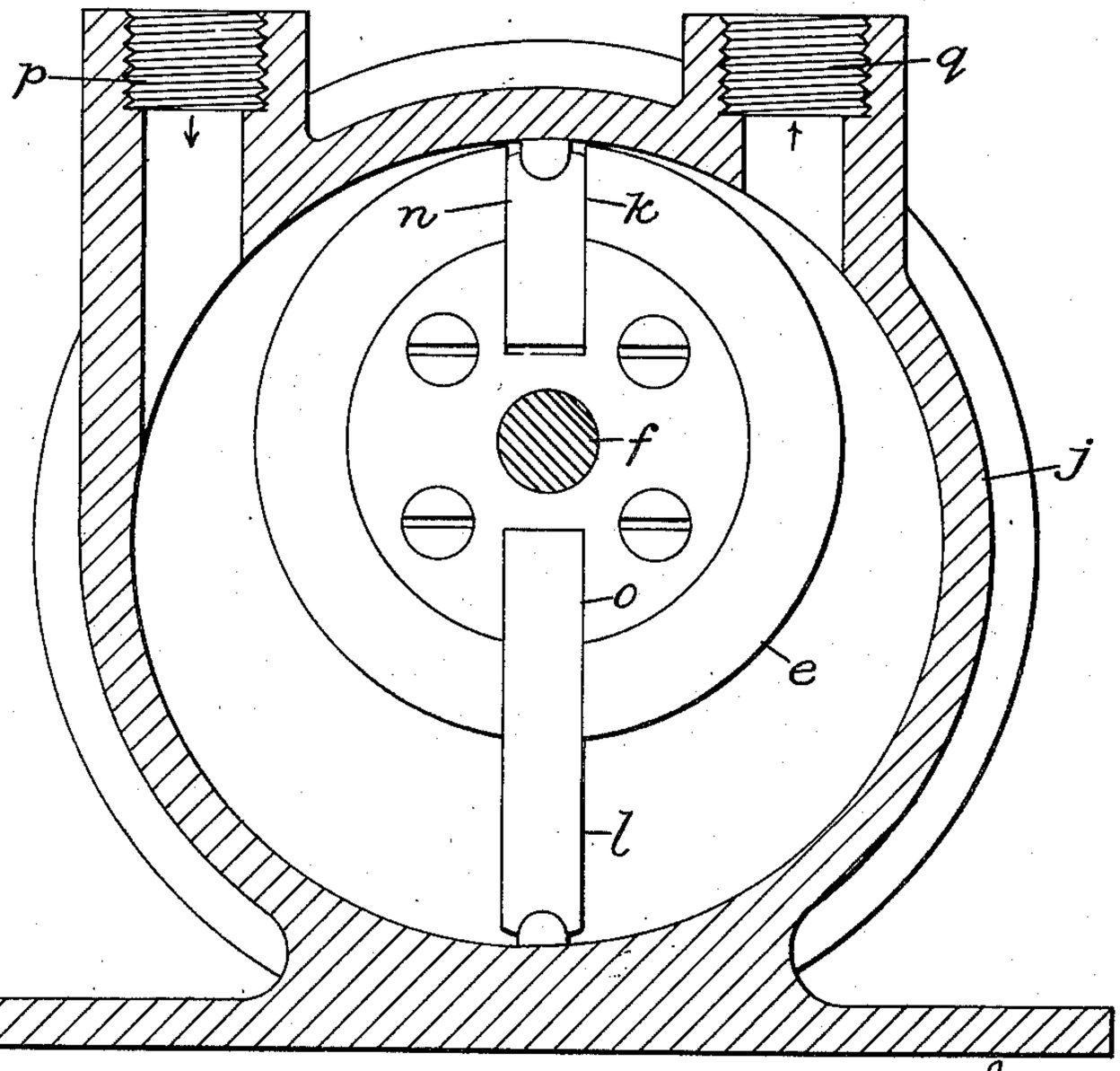


FIG. 5.



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UNITED STATES PATENT OFFICE.

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ROTARY COMPRESSOR.

986,502. Specification of Letters Patent. **Patented Mar. 14, 1911.**

Application filed May 2, 1908. Serial No. 430,629.

To all whom it may concern:

Be it known that I, AMANDUS CHARLES ROESSLER, a subject of the King of Great Britain and Ireland, residing at 189 Earlsfield road, Wandsworth Common, London, S. W., England, engineer, have invented certain new and useful Improvements in and Relating to Rotary Compressors, of which the following is a specification.

This invention relates to fluid compressors of the type in which a rotating drum carrying sliding blades works within a casing.

The object of the present invention is to increase the efficiency and capacity of such compressors. In compressors of this type, two difficulties are encountered viz:—If the blades are spring-pressed against the casing, there is considerable friction resulting in wearing away of the casing and blades, as well as a considerable loss of power and in those forms in which no springs are employed for pressing the blades, there is considerable leakage loss and the capacity of such blowers is comparatively small, owing to the small amount of eccentricity between the casing and the rotating drum. With the view of reducing these difficulties several constructions have been proposed in one of which the casing of a rotary pump or motor was bored out to curves struck from three different centers; in another the casing was gouged out near both the outlet and inlet ports; in another the axis of rotation of the drum of a rotary pump was situated at some distance off a chord joining the extremities of a truly circular portion of the internal surface of the casing of the pump, and in another the inlet port was so situated relatively to the outlet port that compression commenced before the latter was opened. None of these pumps or motors have however more than partially avoided the difficulties and their efficiencies have been considerably below that which is desirable.

The object of the present invention is to entirely overcome the difficulties and to increase the efficiency and capacity of such compressors.

The present invention consists in a rotary pump or compressor having in combination the following features namely, its drum situated at some distance from the end of a chord joining the extremities of the truly circular portion of the casing which casing is struck from three centers with three different radii and is gouged out near the inlet port which is so situated relatively to the outlet port that compression commences before and continues progressively after the latter is opened. And my invention further consists in the method by which the shape of the interior of a casing, designed to contain an eccentrically mounted impeller, the diametrically opposite ends of whose vanes are a constant distance apart and are intended to maintain contact with the interior walls of the casing at all points, is obtained. This method preferably consists in the following: First, forming a basic portion of the interior surface of the casing from which the rest is derived, in the configuration of an arc of a circle; and then forming the remainder of the surface non-concentric with the basic portion, with substantially the configuration of a series of cylindrical arcs struck from a plurality of axes parallel to the axis of the basic portion and with different radii. These axes and the radii are determined from the ends of chords equal to the distance between diametrically opposite ends of the vanes, which pass through the axis of rotation of the impeller and whose other ends lie in the basic cylindrical arc. In this way, the derived portion of the surface will substantially engage the ends of all such chords, thus insuring a proper fit of the vanes at all points in their rotation.

Referring now to the accompanying drawings which form part of this specification: Figure 1 is a diagram showing the position of the various centers from which the different portions of the internal surface of the drum arc struck; Fig. 2 shows a sectional elevation of a form of the device in which a single one piece blade is used; Fig. 3 shows a sectional view on the line A B of Fig. 2; Fig. 4 shows a sectional elevation of a form of the device in which the blade is in two parts; Fig. 5 shows a sectional view on the line C D of Fig. 4.

In carrying out this invention according to one form, the casing is arranged in the form of a circle gouged out at one side, at the suction side. The shape of the casing is preferably obtained by first drawing a line

equal in length to the length of the blade to be used. Taking this line as a diameter, a curve which is the arc of a circle and has approximately the length of a semi-circle is described with a radius equal to one-half the length of the blade. Then a circle having a diameter equal to that of the drum to be used, which diameter coincides with that of the semicircle first drawn, is described in such position that it touches the semicircle. From the periphery of the semicircle lines are then drawn through the center of the drum equal in length to the length of the blade and it will then be found that the curves passing through the free ends of these lines can be described from two different centers with two different radii and that these arcs fall outside of a circle struck from the center of the semicircle above named. The centers from which these arcs are struck are determined from the positions of the free ends of the chords which they connect. Thus a compound curve is produced, approximately one-half of which is truly circular while the remainder is a curve departing somewhat from a semicircle of larger radius. The casing is conveniently formed (Fig. 1) by first turning it out to one radius *a* say two inches then fixing the casing thus turned out, eccentrically to the boring tool so as to gouge out the casing at one side to a different radius *b*, say $1\frac{3}{4}$ inches. A suitable curvature of the casing can then be obtained when the part *x* where two curves join is suitably smoothed off. This is effected by sweeping out the region *c* to a radius *d* say $2\frac{9}{64}$ inches. Of course it will be understood that there are many ways in which this curvature may be arranged and produced in the casing, but in all cases all the chords passing through the center of the rotating drum, *e*, (see Figs. 2 to 5) should be equal. The rotating drum, *e*, is arranged eccentrically not only with respect to the center from which the truly circular portion of the casing is struck, but also with respect to a chord joining the ends of the truly circular portion of the casing, and is mounted on a spindle *f*, which in some cases may be formed integral with the drum, *e*. This spindle, *f*, passes through bearings, *g*, arranged in the covers, *h*, which close the casing, *j*. The drum, *e*, is provided with a slot, *k*, in which is worked a double ended blade, *m*. This blade, *m*, may be arranged all in one piece, as shown in Figs. 2 and 3, or it may be arranged in two pieces, *n* and *l*, with a distance piece, *o*, between, as shown in Figs. 4 and 5. These pieces, *n* and *l*, it will be understood, slide in the slot, *k*, in the drum, *e*, during the rotation of the drum.

According to my improved form of compressor as soon as the blade, *m*, in Figs. 2 and 3, or the two piece blade, *n*, *l*, of Figs. 4 and 5, over-runs the inlet opening, *p*, to the casing, *j*, compression starts and proceeds evenly and regularly till the outlet passage, *q*, is reached. This has not been the case in most compressors of this kind hitherto used where say four air spaces were employed and the capacities of these spaces after leaving the inlet first increased and subsequently diminished. In all cases I prefer to arrange the outlet opening, *q*, for this form of blower well up in the casing, *j*, so that the projection of this opening on the curve of the casing is as small as possible and thereby slip reduced to a minimum. The inlet opening, *p*, may however be arranged as in former types.

By means of my invention the casing of the machine is made of greater capacity on one side than on the other, the truly cylindrical portion being the side of lesser capacity and the nonconcentric or gouged out portion being the side of greater capacity.

In the operation of the machine as a compressor a charge of the compressible fluid is taken into the larger side of the casing, compressed by being passed on into the smaller side of the casing and then expelled from the smaller side of the casing. In order that the nonconcentric or enlarged portion of the casing may be effective to receive the charge of compressible fluid this enlarged portion must be located in advance of or in front of the one port, while the smaller or truly cylindrical portion of the casing in order to be effective for compressing must be located in front of or in advance of the other port. In other words, one port is entered into the casing substantially at the beginning of the enlarged portion thereof, while the other port is entered into the casing substantially at the beginning of the smaller or truly cylindrical portion of the casing. In some cases it may be necessary to provide forced lubrication; this may be effected automatically by the blower and I prefer to insert some means in the outlet pipe for separating the fluid and any oil which may be carried over by the compressed fluid.

It will be understood that many convenient constructions may be employed and any convenient device may be used for driving the compressor. It will also be understood that many modifications may be made to this invention without departing from the spirit thereof.

What I claim as my invention and desire to secure by Letters Patent is:—

1. The combination of a hollow casing provided with inlet and outlet ports, said casing having a truly cylindrical portion, and a non-concentric portion described from a plurality of different centers with different radii whereby the casing is made of

greater capacity on the side adjacent one of the ports than on the side adjacent the other of the ports, the said centers and the length of the radii being such that the arcs so described will engage the ends of all equal chords drawn through a center of rotation, and a sliding piston blade journaled eccentrically within the casing, on said center of rotation so that the ends of the blade will closely fit the walls of the casing at all points in the rotation thereof.

2. A rotary compressor comprising a casing having a truly circular portion and a non-concentric portion described with a plurality of different radii from a plurality of different centers whereby the casing is of greater capacity on one side than on the other, the said centers and the length of the radii being such that the arcs so described will engage the ends of all equal chords drawn through a center of rotation, an inlet port entering the casing on the side of greater capacity, an outlet port entering the casing on the side of lesser capacity, a piston blade journaled eccentrically within the casing on the said center of rotation so that its ends shall closely fit the walls of the casing at all points in the rotation thereof, and the inlet and outlet ports being so disposed with respect to each other and with respect to the blade that the inlet port will be closed before the outlet port is opened, whereby compression will commence and continue progressively before the outlet port is opened.

3. The combination of a hollow casing provided with inlet and outlet ports, said casing having a truly cylindrical portion, and a non-concentric portion described from a plurality of different centers, with a plurality of different radii whereby the casing is made of greater capacity adjacent to one port than it is adjacent to the other port, the said centers and the length of the radii being such that the arcs so described will engage the ends of all equal chords drawn through a center of rotation, a sliding piston blade journaled eccentrically within the casing, the center of rotation of the blade, the centers from which the non-concentric portion of the casing are struck, and the length of their radii being so related that the ends of the blade will fit closely the walls of the casing at all parts in the rotation thereof, and the ports being so disposed with respect to each other and with respect to the blade that in the rotation of the blade the inlet port will be closed before the outlet port is opened, whereby compression will commence and continue progressively before the outlet port is opened.

4. The combination of a hollow casing having a truly cylindrical portion and an enlarged non-concentric portion, a sliding piston blade journaled eccentrically within the casing and arranged to fit said casing at all points, inlet and outlet ports entering the casing, one port entering the casing substantially at the beginning of the enlarged portion and the other port entering the casing substantially at the beginning of the truly cylindrical portion, the said ports being spaced relatively close together with respect to each other so as to be separated a greater distance apart circumferentially in one direction than in the other direction.

5. The combination of a hollow casing having a truly cylindrical portion and an enlarged nonconcentric portion, a sliding piston blade journaled eccentrically within the casing and arranged to fit said casing at all points, an inlet port entering the casing substantially at the begining of the enlarged portion, an outlet port entering the casing substantially at the beginning of the truly cylindrical portion, the said ports being spaced relatively close together with respect to each other so as to be separated a greater distance apart circumferentially in one direction than in the other direction.

6. In combination, a casing, inlet and outlet ports entered into said casing, a drum journaled eccentrically within the casing, a piston blade slidingly engaged in said drum, the casing being of greater capacity adjacent to one of the ports than it is adjacent to the other port, this portion of greater capacity being located in advance of the said port, and the contour of the casing being obtained by describing three merging arcs with three different radii from three different centers in such wise that all chords drawn through the center of rotation will be equal, whereby the end of the piston blade will closely fit the walls of the casing at all points.

7. The method, of producing the interior peripheral surface of the casing of a rotary pump which contains an impeller revoluble on an axis eccentric to said casing and the diametrically opposite ends of whose vanes are a constant distance apart and are intended to maintain contact with said surface at all points in their revolution, which consists in forming a basic portion of said surface, from which the rest is derived, with the configuration of an arc of a cylinder, and forming the remainder of said surface non-concentric with said basic portion with substantially the configuration of a series of cylindrical arcs struck from a plurality of axes parallel to the axis of the basic portion and with different radii, said axes and radii being determined from the ends of equal chords of a cross section of the interior of the casing, each equal to the distance between two diametrically opposite ends of vanes, which pass through the axis of rota-

tion of the impeller and whose other ends lie in the basic cylindrical arc, so that the derived portion of the surface will substantially engage the ends of all such chords opposite to those contained in the basic portion.

In testimony whereof I have hereunto signed my name to this specification in the presence of two subscribing witnesses.

AMANDUS CHARLES ROESSLER.

Witnesses:
ELLIS WYNNE OWEN,
H. D. JAMESON.