No. 685,775. Patented Nov. 5, 1901.

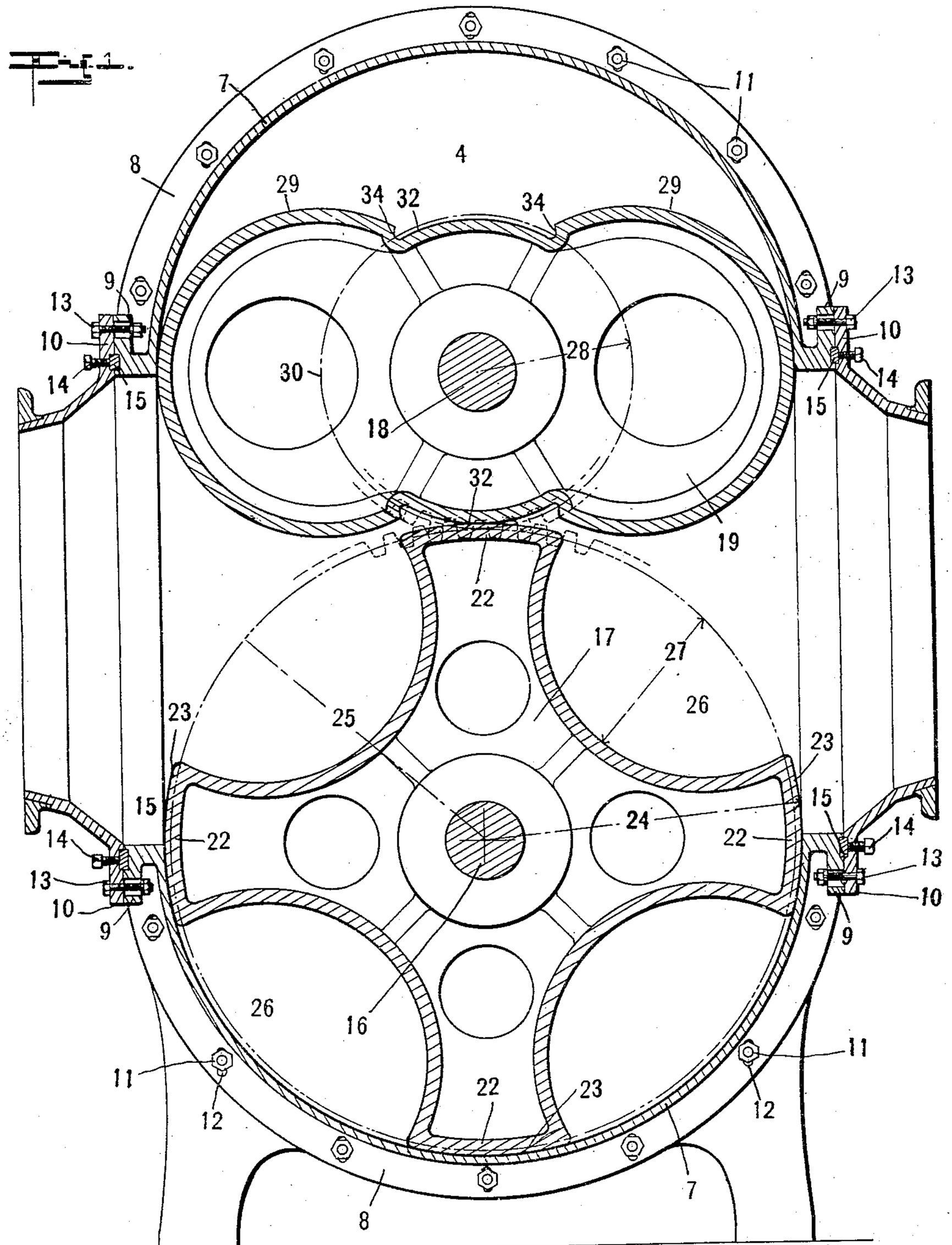
T. J. LINDSAY.

ROTARY PUMP OR BLOWER.

(Application filed Jan. 21, 1901.)

(No Model.) 3 Sheets—Sheet 1.

Fig. 1.



Witnesses
Frank A. Fahle
Bertha M. Ballard.

Inventor
Thomas J. Lindsay
By Arthur M. Hood.
Attorney

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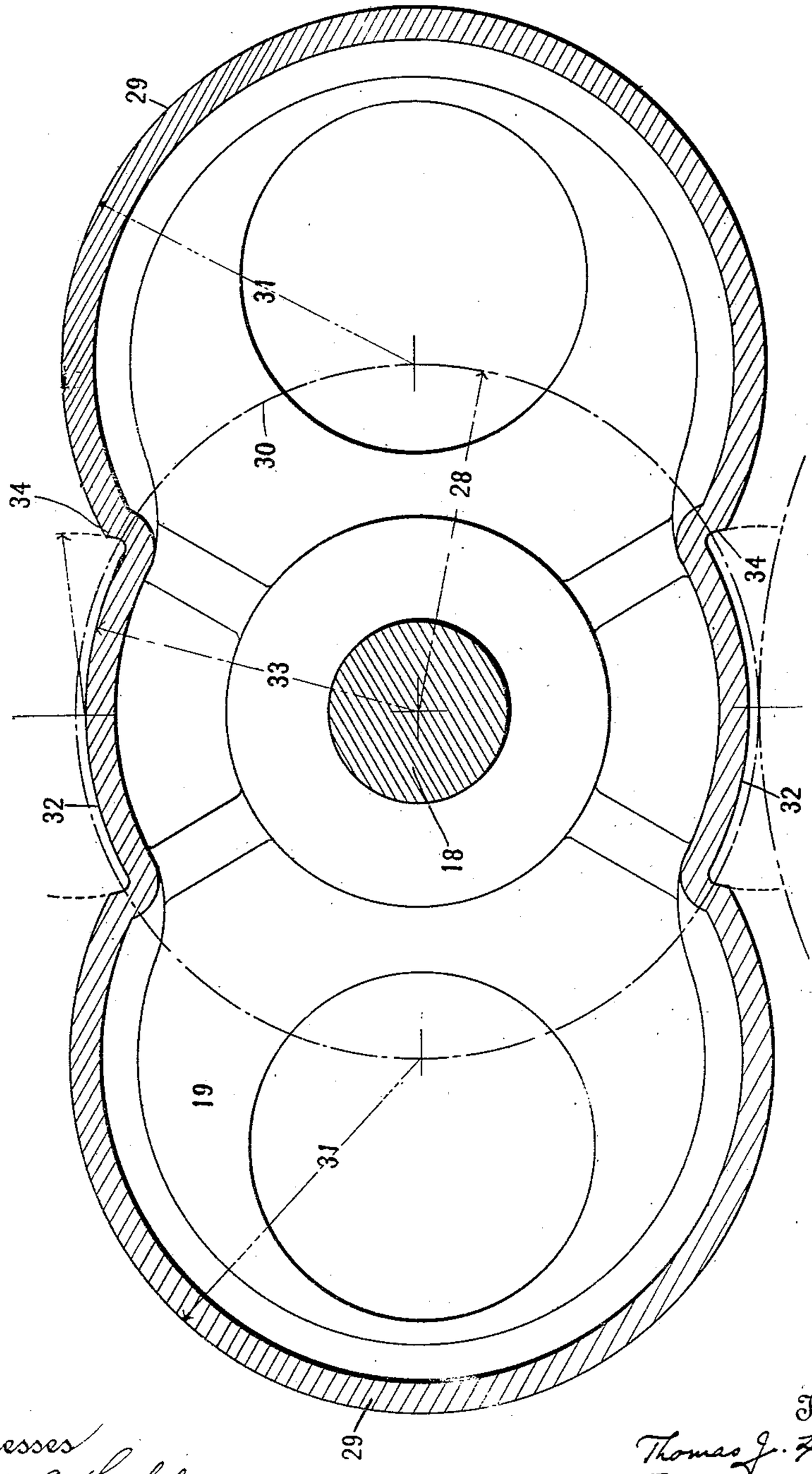

Fig. 2.

Witnesses
Frank A Fahle
Bertha M. Ballard

Inventor
Thomas J. Lindsay
By Arthur M. Hood
Attorney

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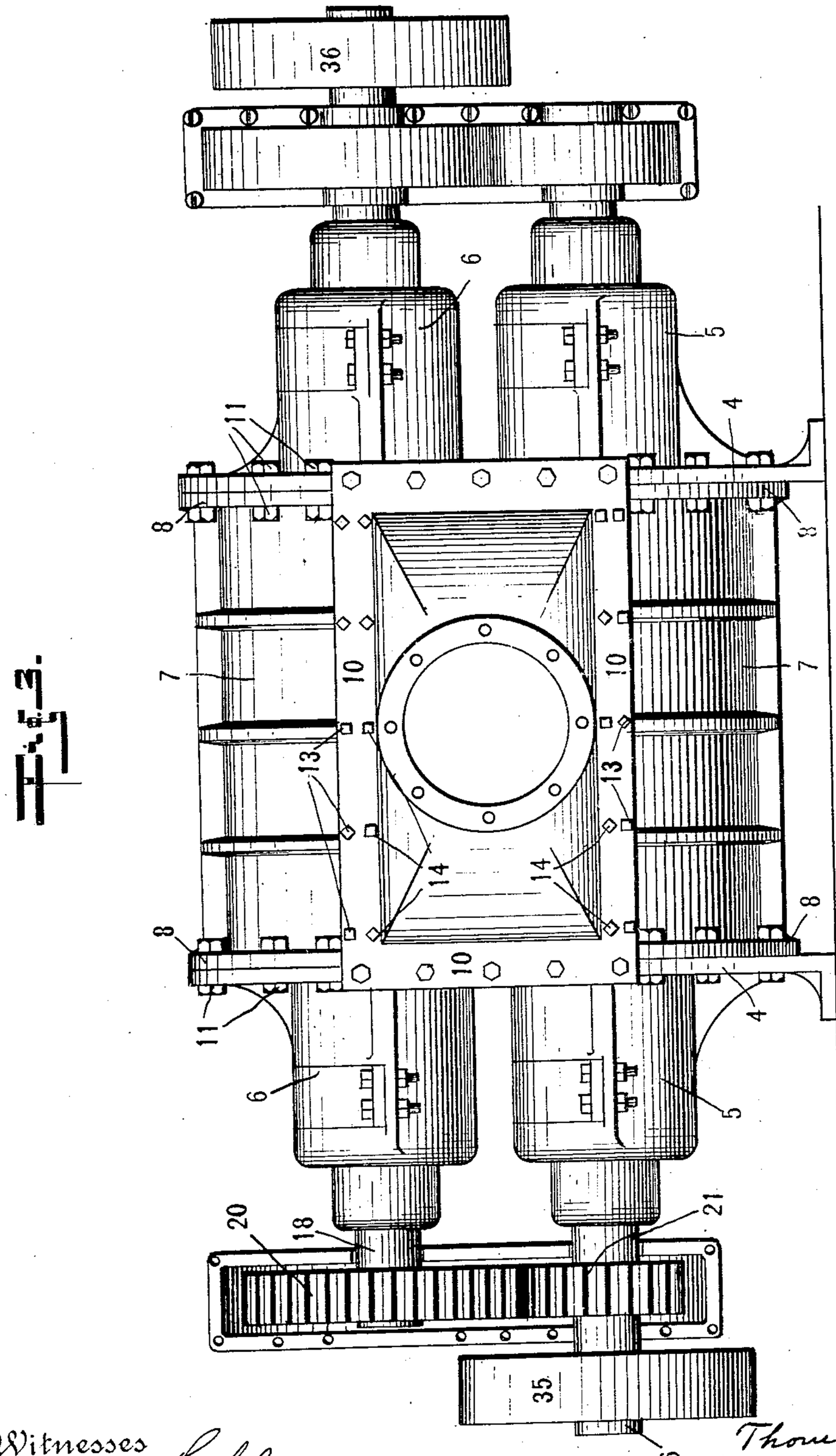

Witnesses
Frank R. A. Fahle
Bertha M. Ballard

Inventor
Thomas J. Lindsay
By Arthur W. Good
Attorney

UNITED STATES PATENT OFFICE.

THOMAS J. LINDSAY, OF INDIANAPOLIS, INDIANA, ASSIGNOR OF ONE-HALF TO CHANDLER & TAYLOR COMPANY, OF INDIANAPOLIS, INDIANA, A CORPORATION OF INDIANA.

ROTARY PUMP OR BLOWER.

SPECIFICATION forming part of Letters Patent No. 685,775, dated November 5, 1901.

Application filed January 21, 1901. Serial No. 43,974. (No model.)

To all whom it may concern:

Be it known that I, THOMAS J. LINDSAY, a citizen of the United States, residing at Indianapolis, in the county of Marion and State of Indiana, have invented a new and useful Rotary Pump or Blower, of which the following is a specification.

My invention relates to an improvement in rotary blowers or pumps of the two-impeller type.

The objects of my invention are to produce a blower or pump of the class described in which one impeller shall rotate at a greater speed than the impeller coöperating therewith, to provide means for making a driving connection with either one of the impeller-shafts, to make the impellers of such cross-section that they will properly coöperate without "pocketing" the fluid, and to provide an impeller-casing in which the parts coacting with the impellers may be adjusted to compensate for wear.

The accompanying drawings illustrate my invention.

Figure 1 is a transverse section. Fig. 2 is a sectional detail, on an enlarged scale, of one of the impellers. Fig. 3 is a side elevation.

In the drawings, 4 4 indicate the sides of a casing, each of which carries a pair of bearings 5 6, the bearings on each side alining with the corresponding bearings of the other side. Secured between sides 4 are two substantially semicylindrical barrels 7, each of which is provided at each end with a flange 8, which coöperates with the adjacent side 4. Each barrel 7 is also provided at each edge with a flange 9, which coöperates with a flange or cross-bar 10. The barrel 7 is secured to and between sides 4 by means of bolts 11, passing through slots 12 in flanges 8. Each barrel 7 is concentric with the axis of the adjacent bearings 5 or 6 and may be shifted between the plates toward and from said axis by means of the slot-and-bolt connection. Flanges 9 and 10 are secured together by means of bolts 13, which pass through openings, allowing a longitudinal play between the flanges. The edges of each barrel may be forced together by means of screw 14, carried by flange 10 and engaging a packing-bar 15, which bar lies in suitable grooves formed in the adjacent faces of flanges 9 and 10. By this arrangement any wear in the inner face of either barrel 7 may be taken up and the face brought concentric with the adjacent axis.

Mounted in bearings 5 is an impeller-shaft 16, which carries an impeller 17. Mounted in bearings 6 is a second impeller-shaft 18, which carries an impeller 19. Secured to shaft 18 is a gear 20, which meshes with a gear 21, secured to shaft 18, in the present drawings gear 20 being twice the size of gear 21. The impeller 17 is composed of a series of axial ribs 22, the number of said ribs being twice the ratio between the intermeshing gears carried by shafts 16 and 18. The outer face 23 of each rib 22 is a circular arc concentric with the axis of the impeller, the radius 24 thereof being slightly greater than the pitch-radius 25. Formed adjacent each rib 22 is a substantially semicylindrical socket 26, the center of which lies between the ribs and upon the pitch-circle and the radius 27 of each being equal to the pitch-radius 28 of the smaller gear 21 plus the difference between the pitch-radius 25 of the larger gear and the radius 24 of the face 23 of rib 22. The radius of each barrel 7 is equal to the radius 24.

The impeller 19 is composed of two lobes, the face of each of which is a circular arc 29, the center of which lies upon the pitch-circle 30, which circle is equal to the pitch-circle of the gear 21. The radius 31 of arc 29 is equal to the radius 28 plus the difference between the radius 25 of the large pitch-circle and the radius 24 of the face of ribs 22, the radius 31 being therefore equal to the radius 27 of socket 26. The lobes of this impeller are diametrically opposed, and formed between said lobes is a waist portion consisting of a pair of circular arcs 32, concentric with shaft 18 and of a radius 33 equal to the radius 28 minus the difference between the radius 24 of the larger pitch-circle and radius 25 of the faces 23. Joining each end of the surfaces 29 with the adjacent ends of the waist-arcs 32 is a hypocycloidal arc 34, generated by the edge or corner of rib 22 rolling upon arc 32, the dis-

tance between arcs 32 in the pitch-line being equal to the pitch width of rib 22.

Shaft 16 is provided with a driving-pulley 35, and shaft 18 is provided with a driving-pulley 36, the arrangement being such that a driving connection may be made with either one of the shafts. By this arrangement, with the driving speed a constant, if it be applied to shaft 16 a flow of great volume and low pressure will be produced, impeller 19 making two revolutions to one of the impeller 17. If the driving connection be made with shaft 18, a flow at higher pressure and less volume will be had, shaft 18 rotating at the driving speed, while shaft 16 will rotate at one-half that speed.

If in operation there be a wear between the points of contact of the impellers with the barrels 7, said barrels may be adjusted toward or from their centers by means of the slot-and-bolt connections 11 and 12, and the edges of said barrels may be sprung toward the center by means of the bolts 14, a tight joint being maintained by the packing-bar 15.

I claim as my invention—

1. An impeller for rotary blowers consisting of a pair of diametrically-opposed lobes, the face of each lobe being upon a circular arc struck from a point outside the axis, a waist portion consisting of a pair of circular arcs concentric with the axis, and hypocycloidal arcs connecting each end of each of the waist-arcs with the lobe-arcs.

2. An impeller for rotary blowers consisting of a pair of diametrically-opposed lobes, the face of each lobe being upon a circular arc struck from a point outside the axis, a waist portion consisting of a pair of circular arcs concentric with the axis, and a surface connecting each end of the lobe-arcs with the adjacent waist-arcs and at an angle to both.

3. An impeller for rotary blowers consisting of a pair of diametrically-opposed lobes, the face of each lobe being a circular arc struck from a point on the pitch-circle, and having a radius greater than the pitch-radius, a waist portion extending between said lobes and consisting of circular arcs struck from the axis and of less radius than the pitch-radius, and a surface connecting each end of the lobe-arc with the adjacent end of the waist-arc at an angle to both of said arcs.

4. An impeller for rotary blowers consisting of a pair of diametrically-opposed lobes, the face of each lobe being a circular arc struck from a point upon the pitch-circle, and having a radius greater than the pitch-radius, a waist portion consisting of a pair of circular arcs struck from the axis and having a radius less than the pitch-radius, and a hypocycloidal arc connecting each end of the waist-arcs with the lobe-arcs.

5. In a rotary blower, the combination of a pair of impellers the pitch-circle of one of said impellers being a whole number of times greater than the pitch-circle of the other impeller; the impeller having the small pitch-circle consisting of a pair of diametrically-opposed lobes, the face of each lobe being a circular arc struck from the pitch-line, and the waist of said impeller consisting of a pair of circular arcs concentric with the pitch-circle; and the second of said impellers consisting of a series of axial ribs equal in number to twice the ratio between the pitch-circles and each having a face formed upon a circular arc struck from the axis, and a series of semicylindrical sockets formed between said ribs and having a radius equal to the radius of the lobes of the first impeller.

6. In a rotary blower, the combination of a pair of impellers the pitch-circle of one of said impellers being a whole number of times greater than the pitch-circle of the other impeller; the impeller having a small pitch-circle consisting of a pair of diametrically-opposed lobes, the face of each lobe being a circular arc struck from the pitch-line, the waist of said impeller consisting of a pair of circular arcs concentric with but of less radius than the pitch-circle, and hypocycloidal arcs, generated upon the waist-arcs, connecting the waist and lobe arcs; the second of said impellers consisting of a series of axial ribs equal in number to twice the ratio between the pitch-circles and each having a face formed upon a circular arc struck from the axis with a radius greater than the pitch-radius so as to engage the waist portion of the other impeller, and a series of semicylindrical sockets formed between said ribs and struck from a center upon the pitch-circle and having a radius equal to the radius of the lobes of the first impeller.

7. In a rotary blower, the combination with an impeller, of a semicylindrical barrel partially surrounding and coacting with said impeller, and means for springing the opposite edges of said barrel toward the axis.

8. In a rotary blower, the combination with an impeller, of a semicylindrical barrel partially surrounding and coacting with said impeller, means for adjusting said barrel toward and from the axis, and means for springing the opposite edges of said barrel toward the axis.

THOMAS J. LINDSAY.

Witnesses:
ARTHUR M. HOOD,
BERTHA M. BALLARD.