

Aug. 31, 1954

J. H. WOODWARD

2,687,844

CENTRIFUGAL AIR CIRCULATING UNIT

Filed Oct. 24, 1949

4 Sheets-Sheet 1

Fig. 1.

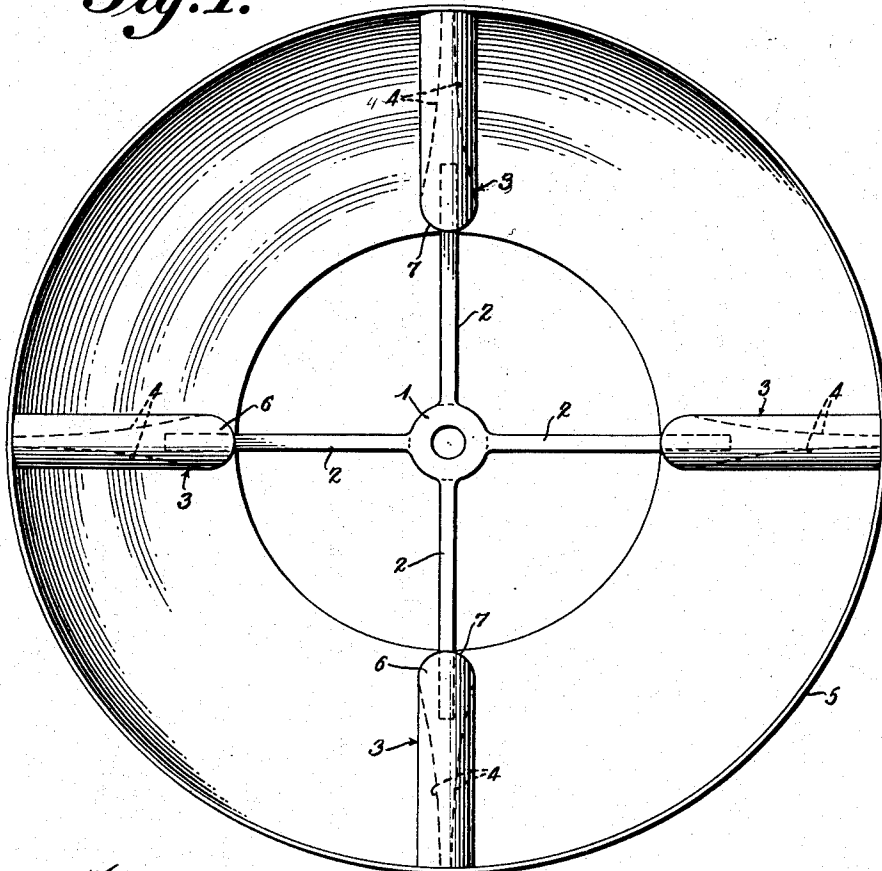
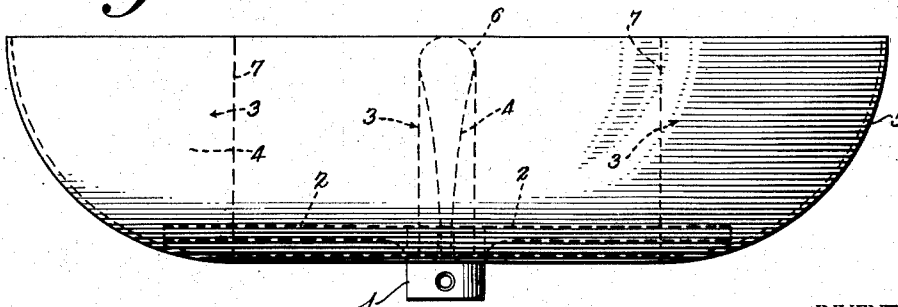


Fig. 2.



INVENTOR

Joseph H. Woodward

BY *Stevens, Davis, Miller & Mosher*
ATTORNEYS

Aug. 31, 1954

J. H. WOODWARD

2,687,844

CENTRIFUGAL AIR CIRCULATING UNIT

Filed Oct. 24, 1949

4 Sheets-Sheet 2

Fig. 3.

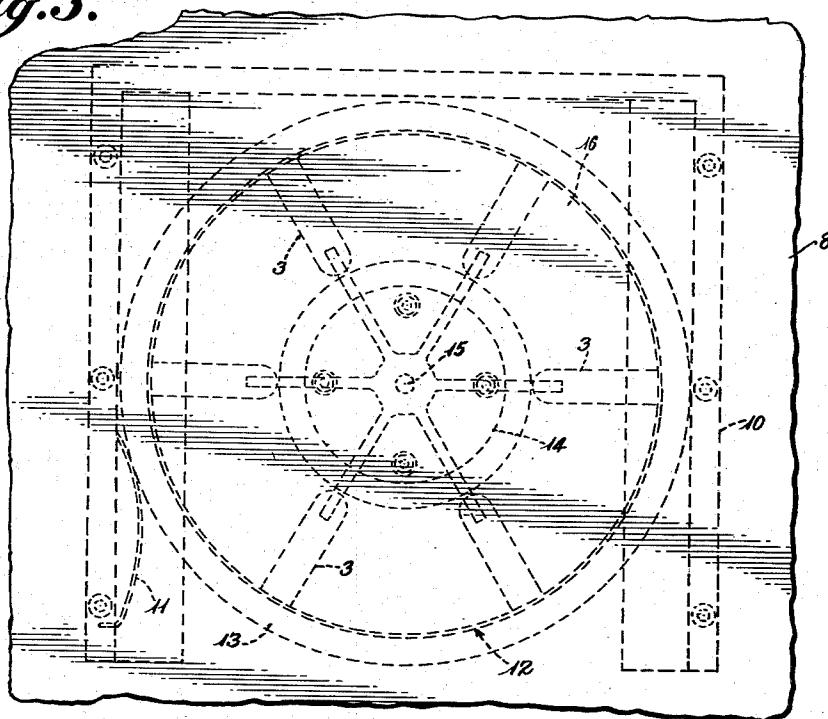


Fig. 4.

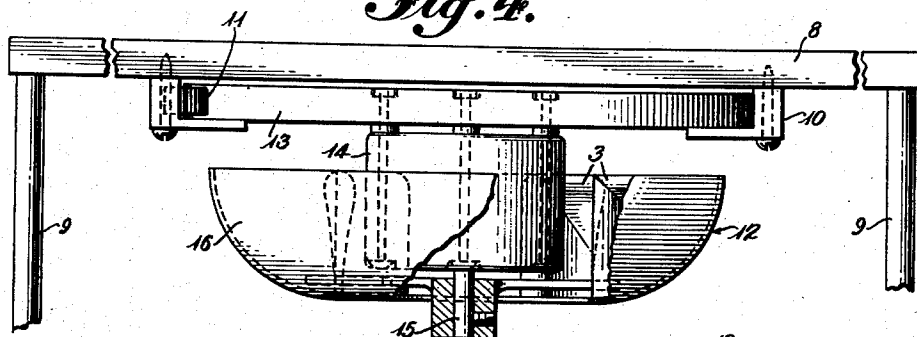


Fig. 5.

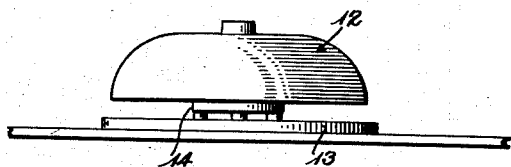
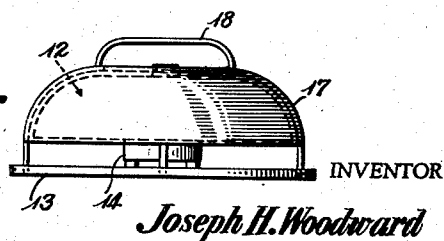


Fig. 6.



Joseph H. Woodward

BY

Stevens, Davis, Miller & Washburn

ATTORNEYS

Aug. 31, 1954

J. H. WOODWARD

2,687,844

CENTRIFUGAL AIR CIRCULATING UNIT

Filed Oct. 24, 1949

4 Sheets-Sheet 3

Fig. 7.

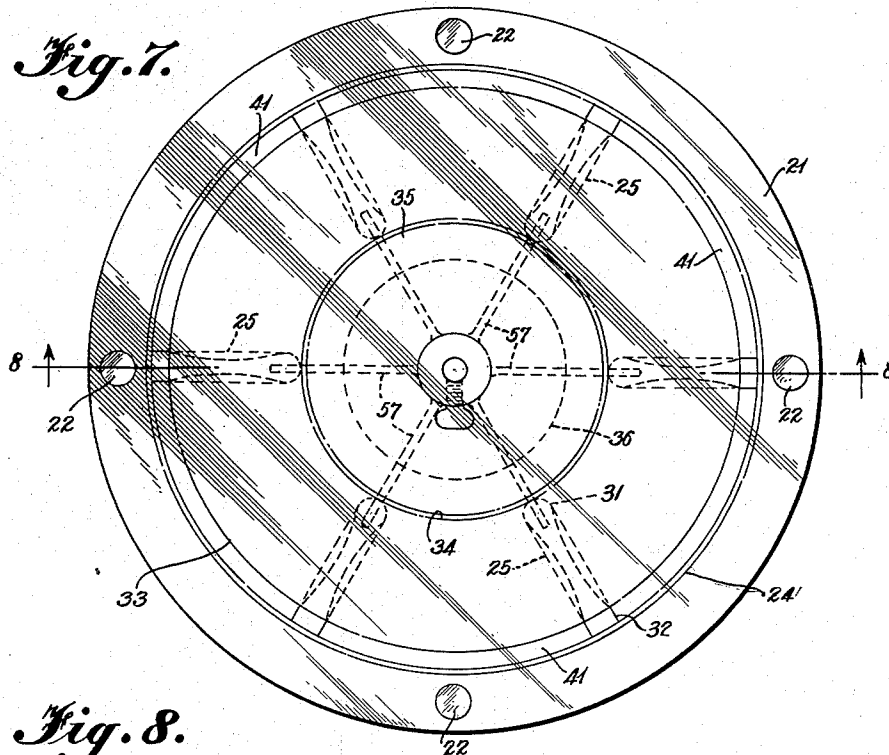
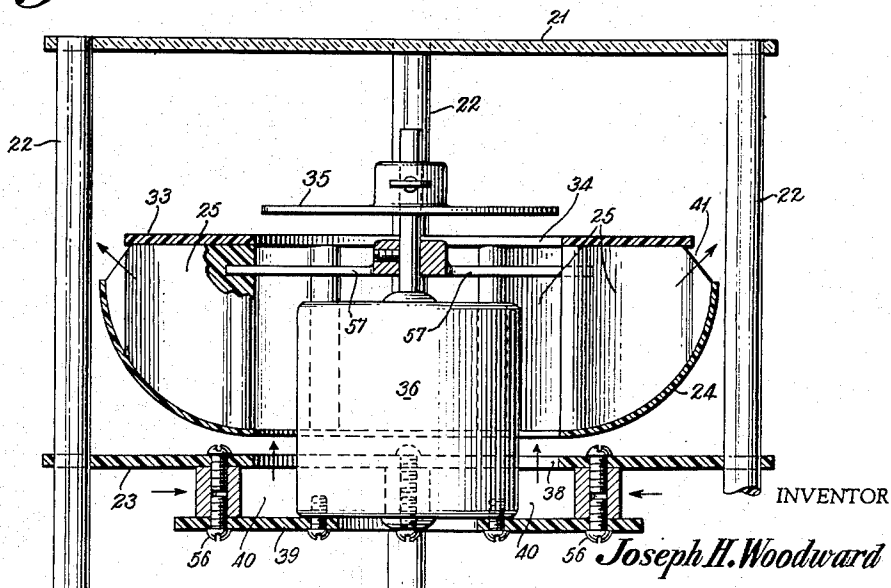


Fig. 8.



BY *Stevens, Davis, Miller & Mosher*
ATTORNEYS

Aug. 31, 1954

J. H. WOODWARD

2,687,844

CENTRIFUGAL AIR CIRCULATING UNIT

Filed Oct. 24, 1949

4 Sheets-Sheet 4

Fig. 9.

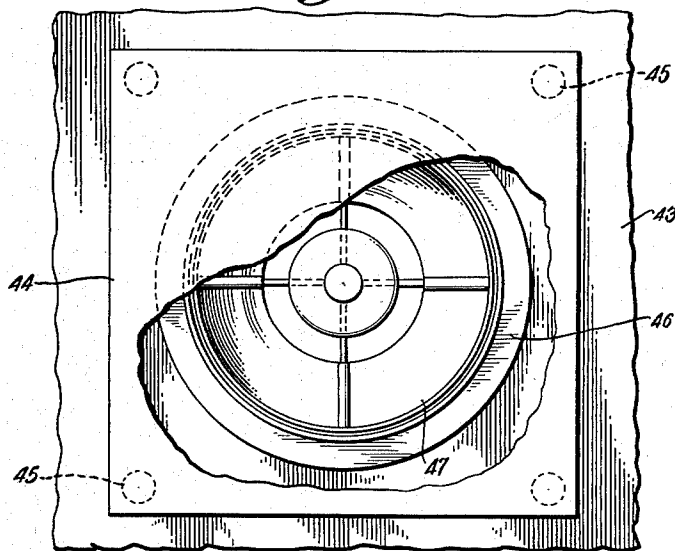


Fig. 10.

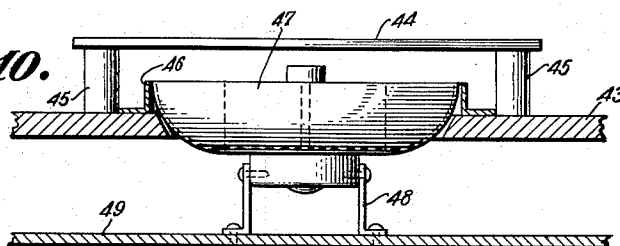
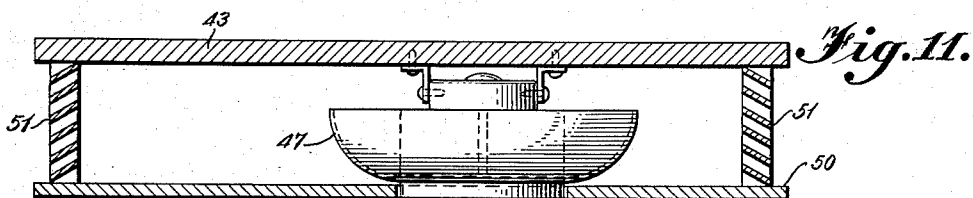


Fig. 12.

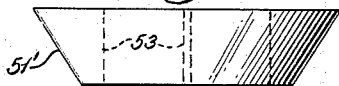


Fig. 13.

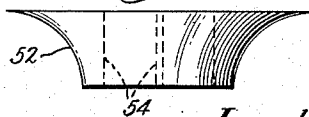


Fig. 14.



INVENTOR

Joseph H. Woodward

BY

Stevens, Davis, Miller & Wether
ATTORNEYS

UNITED STATES PATENT OFFICE

2,687,844

CENTRIFUGAL AIR CIRCULATING UNIT

Joseph H. Woodward, Miami, Fla.

Application October 24, 1949, Serial No. 123,222

3 Claims. (Cl. 230-117)

1

This invention relates to a centrifugal air circulating unit that will distribute air evenly so that all persons or objects in the area immediately surrounding the unit will be affected by the air thus distributed.

Accordingly, this invention provides a compact centrifugal air circulating unit which comprises a base, a motor mounted thereon, and a particular centrifugal air circulating rotor provided with suitable means for attachment to the motor drive shaft. The rotor is characterized by a configuration which eliminates the necessity of providing a protective guard for moving parts of the unit. Further, the rotor can be constructed of suitable materials such as metals or plastics which can be colored or transparent and thereby enhance the appearance of the unit. The unit is also provided with means to alter the area of the air inlets to the unit and thus control the direction, volume and velocity of the exhaust air stream.

It is therefore an object of this invention to provide a compact centrifugal air circulating unit of improved design which will operate noiselessly, efficiently and economically to evenly distribute air.

It is another object of this invention to provide a centrifugal air circulating unit having means to control the direction, volume, and velocity of the exhaust air stream.

Other and further objects of the present invention will become apparent from a detailed consideration of the following description when taken in conjunction with the drawings in which:

Figure 1 is a view in top plan of a rotor for the unit of the present invention;

Figure 2 is a view in side elevation of the rotor shown in Figure 1;

Figure 3 is a view in top plan showing the unit of the present invention mounted on the underside of a table top;

Figure 4 is a view in side elevation of the assembly shown in Figure 3;

Figure 5 is a view in side elevation showing the unit of the present invention placed on a table top;

Figure 6 is a view in side elevation showing the unit provided with means to facilitate transportation;

Figure 7 is a view in top plan showing the unit of the present invention mounted with a transparent utility stand;

Figure 8 is a view in vertical section of the assembly shown in Figure 7 taken through the longitudinal axis of the unit;

2

Figure 9 is a view in top plan showing the assembly of Figure 10;

Figure 10 is a view in side elevation partly in section showing the unit of the present invention utilized as an attic ventilator;

Figure 11 is a view in side elevation showing the unit of the present invention utilized as a means for interchanging air between separate spaces;

Figure 12 is a view in side elevation of a modified rotor for the centrifugal air circulating unit of the present invention;

Figure 13 is a view in side elevation of another modified rotor; and

Figure 14 is a view in side elevation showing a modified impeller design for the unit of the present invention.

Referring now to the drawings, Figures 1 and 2 illustrate a rotor for use with the unit of the present invention. A hub 1 is provided having set screw means which permit rigid mounting on a motor drive shaft. Projecting from the hub 1 are radial supporting spokes 2 which are attached to centrifugal air impellers 3. The surfaces 4 of the impellers 3 are substantially uniformly concave. A rim or hollow dome-like member 5 open on both ends and of substantially truncated hemispherical shape encircles the impellers 3 and the outer edge of each impeller 3 is connected to the inner surface of the rim 5. The greatest depth of concavity of each impeller occurs along the line of contact between the impeller and the rim 5. The remaining edges of the impellers 3 are rounded as indicated at 6 and 7.

The concave impeller surfaces 4 and rounded edges 6 and 7 permit the rotor to move at greater speeds with less attendant noise and to circulate greater volumes of air at any given speed as compared to plane surfaced impellers. Further the rim 5 cooperates with the impeller 3 to accomplish the above results.

In Figures 3 and 4 is illustrated the unit of the present invention mounted on the underside of a table top 8 which is supported by means of legs 9. A bracket suspension frame 10 is fixed to the undersurface of table top 8 as by screws. The unit generally designated as 12 consists of a motor base 13 preferably of a sound proofing material upon which is mounted a motor 14 as by bolts. The motor drive shaft 15 has mounted thereon by means of a set screw a rotor 16 having six impellers 3. The rotor 16 and impellers 3 constitute a structure similar to that shown in Figures 1 and 2. The motor base 13 is securely retained in the bracket 10 by means

3

of a retaining spring 11. The unit 12 can be readily removed from the bracket 10 by overcoming the force of spring 11. After removal of the unit 12 it can be placed upon a table top as shown in Figure 5 and used in this position. If desired the motor base 13 can be connected to the table top, however, this is optional.

In Figure 6 is shown the unit 12 provided with a protective housing or guard 17 which encloses the rotor of the unit and is fixed to the motor base. To facilitate transportation of the unit a carrying handle 18 is attached to the housing 17.

In Figures 7 and 8 the unit of the present invention is shown mounted with a transparent utility stand which consists of a glass plate top 21 supported on plastic legs 22. A plastic platform 23 provided with a central aperture 33 is also mounted between legs 22 below the top 21. The elements of the stand can be conveniently assembled by means of cement applied to the proper joints and connections. The centrifugal air circulating unit is mounted on the platform 23 by having the motor base 39 suspended therefrom by suitable means such as by bolts 56. The motor 36 is mounted on motor base 39 as by bolts and projects upwardly through the aperture 38. The rotor of the unit including a rim 24, concave impellers 25, and a disk 33 having a central opening 34 is mounted on the motor drive shaft by means of spokes 57 attached between the impellers 25 and a hub fixed on the shaft by a set screw. This mounting is shown in Figure 8. The impellers 25 of the rotor extend beyond the edge of the rim 24. The greatest depth of concavity of the impellers 25 occurs between their rounded edges 31 and 32 as indicated in Figure 7. The disk 33 is superimposed over the impellers 25 and attached to their upper edges. Consequently air can pass into the rim 24 through passages 40 defined between motor base 39 and platform 23 which communicate with aperture 38 and opening 34 and can leave through the openings 41 defined between the edge of the disk 33 and edge of the rim 24.

A disk 35 constituting a damper is adjustably mounted on the motor shaft above the opening 34 in disk 33.

In operation air is drawn into the unit through opening 34 and passages 40 and discharged through openings 41. By means of damper 35 the direction, velocity, volume, etc. of the discharge air can be controlled. If damper 35 is positioned to completely close opening 34, then air enters the unit through passages 40 and discharges from openings 41. The discharged air will proceed outwardly only a short distance from the unit and be bent downwardly and recirculated due to the suction effect of the intake air moving through passages 40. If damper 35 is positioned to leave opening 34 completely free, the exhaust air from openings 41 will proceed straight up and will be bent inwardly due to the suction effect of the intake air passing through opening 34. Hence the direction of the exhaust air can be varied between these horizontal and vertical extremes by the position of damper 35 relative to opening 34.

In Figures 9 and 10 is shown the unit of the present invention utilized as an attic ventilator. As shown, a roof 43 is provided with an opening. A flash cylindrical coaming 46 surrounds this opening and projects outwardly from roof 43. Also mounted outside of roof 43 is a protective shelter 44 supported on posts 45 attached to the

4

roof 43. The unit 47 is supported on ceiling 49 by legs 48 rigidly fixed thereto so that its rotor projects through the opening in roof 43. The coaming 46 fits closely about the rotor to prevent undue air leakage. This assembly illustrates a compactness of installation that is possible to achieve with the unit of the present invention.

Figure 11 shows a further way to utilize the unit for attic ventilation. Here a roof 43 is mounted with a ceiling 50 having an opening by spaced louvres 51. The unit 47 is mounted to the roof 43 so that its rotor fits closely over the opening in the ceiling 50. The air from below ceiling 50 is drawn into the unit 47 through the opening therein and is exhausted from the unit 47 through the space between the ceiling 50 and roof 43 formed by louvres 51.

Figures 12 and 13 illustrate variations on the external configuration of the rotor of the unit. As shown in Figure 12, the rim 51 of the rotor constitutes substantially a frustum of a cone. The impellers 53 are fixed within rim 51 in a manner similar to that shown with respect to the impellers of Figures 1 and 2. The rotor shown in Figure 13 has a rim 52 the outer surface of which is curved inwardly. In a like manner to the rotor of Figure 12, impellers 54 are fixed within rim 52. A variation of the impeller design is illustrated by Figure 14. As shown impellers 55 are curved along their inner edges as distinguished from the impellers shown in Figures 12 and 13.

While this invention has been shown and described in specific embodiments, nevertheless, various changes and modifications obvious to one skilled in the art are within the spirit, scope and contemplation of the present invention.

I claim:

1. A centrifugal air circulating unit that comprises a flat base, a motor mounted on said base with its drive shaft projecting normal to said base, a hub rigidly mounted on the drive shaft of said motor for rotation therewith, impeller blades disposed symmetrically around said motor, spokes connecting said impeller blades with said hub, a bowl-like member encircling said blades and thereby encircling said motor and integral with said blades at the points of contact between said member and said blades, said member having a central cutout of a cross section larger than the cross section of said motor which constitutes an inlet for air, and the rim of said member lying relatively closely spaced from said flat base to define therebetween a 360° outlet for air the diameter of said member being less than any of the planar dimensions of said base, whereby the air discharge from said impellers impinges on said base and is thereby caused to follow a path substantially parallel to the plane of said base, and said member substantially encloses said motor thereby functioning as a protective guard or housing for said motor.

2. A centrifugal air circulating unit that comprises a base, a motor mounted on said base with its drive shaft projecting normally away from said base, a hub rigidly mounted on the drive shaft of said motor for rotation therewith, impeller blades, means connecting said impeller blades with said hub so that said impeller blades are uniformly spaced around said motor, a hollow truncated hemispherical member open at both ends, said member defining an inlet at its smaller end for air, said member encircling said impeller blades and connected to them at the

5

points of contact between said impeller blades and said member, one end of each of said impeller blades being projected a short distance beyond the larger end of said member, a disc having a central inlet for air mounted on the projecting ends of said impeller blades to define between said disc and the larger end of said member an outlet for air, said member substantially enclosing said motor and thereby eliminating the necessity for a protective guard or housing for said motor.

3. An air circulating unit as defined in claim 2 wherein means are provide adapted to cooperate with said disc to control the effective opening of said central inlet and thereby control the velocity, direction and volume of air being dis-

6

charged from the outlet defined between said disc and the larger end of said member.

References Cited in the file of this patent

UNITED STATES PATENTS

Number	Name	Date
690,100	Chodzko -----	Dec. 31, 1901
707,842	Hawkins -----	Aug. 26, 1902
995,725	Rothenberg -----	June 20, 1911
1,321,378	Kohn -----	Nov. 11, 1919
1,433,995	Fowle -----	Oct. 31, 1922
1,457,113	Langworthy -----	May 29, 1923
1,699,201	Guth -----	Jan. 15, 1929
2,030,993	Langenkamp -----	Feb. 18, 1936
2,334,789	Olson -----	Nov. 23, 1943