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L. J. CONN

3,336,010

BLENDER ROTOR

Filed Jan. 18, 1966

Fig. 1.

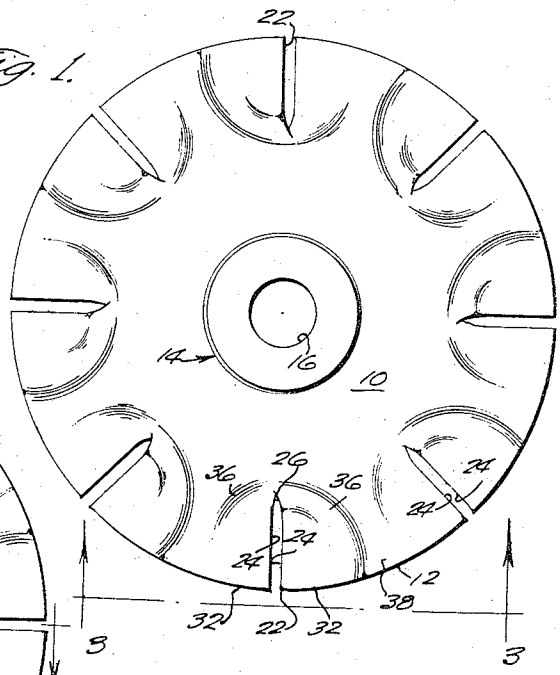


Fig. 2.

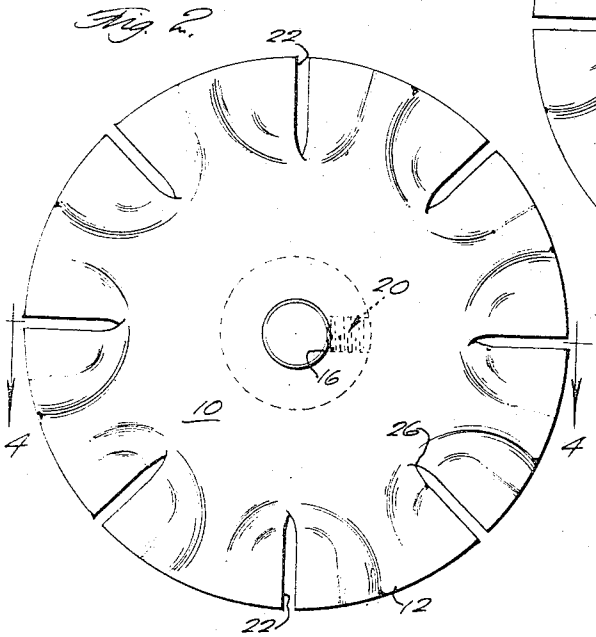


Fig. 3

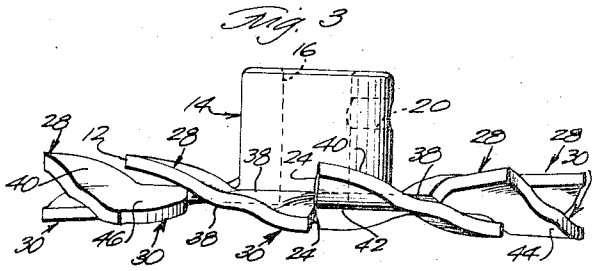
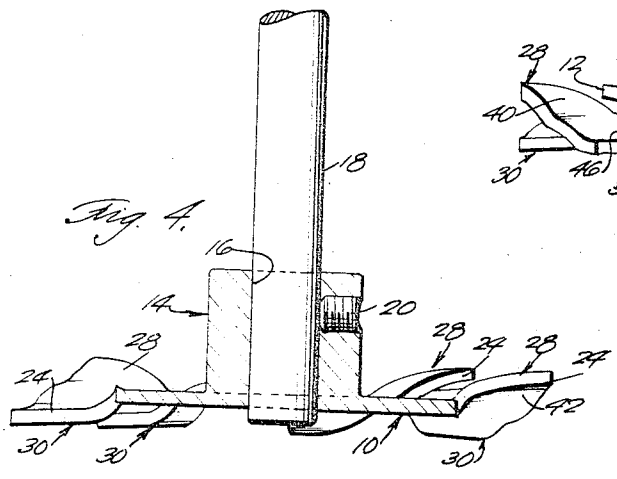


Fig. 4.



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BLENDER ROTOR

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ABSTRACT OF THE DISCLOSURE

A blender rotor formed as a circular disc having a plurality of circumferentially spaced radial slots opening to its peripheral edge, a pair of blades formed at each slot by bending opposite sides of each slot in opposite directions, each formed blade being cup-shaped and curved in two directions at right angles to one another, and being shaped as a spherical triangle having a base coinciding with the peripheral edge of the disc, an altitude side which is a continuation of the related side of the slot from which it is bent and an arcuate hypotenuse which is fared into the related side of the disc. The upper surface of the blade formed on one side of a slot is convex, while the corresponding upper surface of the blade formed on the other side of the same slot is concave. All of the blades and the entire disc are continuous surfaces free of apertures except for said slots and a central opening in the disc to receive a drive shaft.

This invention relates to devices for blending fluids, semi-fluids, and gaseous materials for forming homogeneous and substantially homogeneous fluids, from materials of differing constitutions, by means of rotary mechanical agitation, mastication, and intermixing; and more particularly to a rotary blender rotor adapted to perform these functions simultaneously and continuously.

The primary object of the invention is the provision of a more effective and efficient device of the kind indicated, which is employable singly, in multiples, and in reversed positions, for obtaining predictable superior blending effects.

Another object of the invention is the provision of a simple and uncomplex device of the character indicated above, which is in the form of a disc which is characterized by circumferentially spaced radial slots which extend to the periphery of the disc, these slots forming separations between pairs of adjacent and oppositely angled blades, the facing edges of the blades being continuations of the edges of the slots, and serving as cutting edges acting to cut and masticate materials being subjected to blending.

A further object of the invention is the provision, in a device of the character indicated above, of blades which are of irregular concavo-convex cross sections, which provide, as to adjacent blades, concave surfaces adjacent to cutting edges, which act to throw cut material back and forth between the concave surfaces of and the cutting edges of opposed blades, so as to obtain greater agitation, mixing, and mastication of materials, as the device is rotated, at selected speeds, the effective cutting edges of the blades being the leading edges of the blades, according to the direction of rotation of the device.

In the drawings:

FIGURE 1 is a top plan view of a device of the present invention;

FIGURE 2 is a bottom plan view thereof;

FIGURE 3 is an edge elevation, taken from the line 3—3 of FIGURE 2; and,

FIGURE 4 is a vertical transverse section, taken on the line 4—4 of FIGURE 2, showing the device fixed to a rotary shaft.

Referring in detail to the drawings, the illustrated device comprises a circular flat disc **10**, having a peripheral edge **12**, and an upstanding axial tubular boss **14**, the boss being formed with an axial smooth bore **16**, adapted to accept a rotary shaft **18**, and provided with a set screw **20** for fixing the disc to the shaft. The invention contemplates other suitable means of attachment of a rotary shaft to the disc **10**.

The disc **10** is formed, at equally circumferentially spaced intervals, with radial slots **22**, having straight substantially parallel spaced side edges **24**, and preferably V-shaped closed inner ends **26**. The length of the slots **22** can be varied, but, as herein shown, are preferably shorter than half of a radius of the disc **10**.

Similar, oppositely angled, opposed upper and lower blades **28** and **30**, respectively, are located at opposite sides of the slots **22**, and are preferably formed of the material of the disc **10**. As shown in FIGURES 1 and 2, the blades are cup-shaped, being curved in two directions at right angles to one another and of substantially spherical right-triangular shapes, having base sides **32**, represented by the peripheral edge **12** of the disc, altitude sides **34**, defined by the related edges of the slots **22**, and curved hypotenuse sides **36**, which are fared into the related surfaces of the disc **10**. Flat, undistorted portions **38** of the disc **10** are present between the hypotenuse sides **36** of the adjacent blades of pairs of blades.

As shown in FIGURES 3 and 4, the upper blades **28** are disposed at acute upward angles, relative to the plane of the disc **10**, and the lower blades **30** disposed at similar downward angles, relative to the plane of the disc **10**, circumferentially of the disc. Where, as herein illustrated, the blades are formed of the material of the disc **10**, the upper blades have convex upper surfaces **40** and concave under surfaces **42**, which correspond to convex lower surfaces **44** and concave upper surfaces **46**, of the lower blades **30**.

As shown in FIGURE 4, the blades, besides being angled, relative to the plane of the disc **10**, circumferentially of the disc **10**, are also angled radially outwardly, relative to the plane of the disc **10**, at substantially the same acute angles.

Two or more of the rotors can be used on a single rotary shaft, at various spacings therealong, either with the blades of such rotors disposed in the same or in reversed directions. In the case of the use of a single rotor, the same can be disposed to effectively rotate with the leading edges of its upper blades positioned forwardly or the leading edges of the lower blade positioned forwardly, or in the direction of rotation of the rotor.

Given a normal position of the rotor, with the leading edges of the upper blades **28** positioned in the direction of rotation of the rotor, as from right to left in FIGURE 3, the leading edges of the upper blades **28** act to cut, break up and masticate the material in which the rotor is immersed, while the concave undersurfaces of these upper blades act to trap and throw material downwardly, with a violent change of direction. At the same time, the material momentarily trapped beneath the upper blades **28**, is freed, by reason of the downward angling of the lower blades **30**, to escape from beneath the upper blades, in another violent change of direction. As a result, the material is subjected to more violent and more complete agitations and mixings than are obtained by present blender rotors, which actions are repeated regularly around the circumference of the rotor. The passage of each upper blade **28** through the material, and the resultant vacuum created behind the upper blade, is immediately filled by material, which is then acted on by the next succeeding upper blade, and the associated lower blades **30**.

What is claimed is:

1. A blender rotor comprising a horizontally disposed, circular disc having a plurality of circumferentially spaced radial slots extending outwardly from points spaced from the center and opening to the peripheral edge of the disc, a pair of blades formed by bending opposite sides of each slot to angle out of the plane of the disc toward the upper and lower sides of the disc respectively, each said blade being cup-shaped and curved in two directions at right angles to one another and having a peripheral shape corresponding substantially to a spherical triangle whose base coincides with the peripheral edge of the disc, each said triangular blade having an altitude side which is a continuation of the related side of the slot from which it is bent, and an arcuate hypotenuse which is fared into the related side of the disc, the blade formed on one side of a slot having a convex upper surface and a concave lower surface, while the blade formed on the opposite side of the same slot has a concave upper surface and a convex lower surface, the hypotenuse side of one blade of each of said pairs of blades being integrally connected to the hypotenuse side of the other and adjacent blade of the pair of blades formed at the adjacent slot by said fared portions and a small connected flat portion of the disc, all of said blades and the entire disc being continuous and free of apertures except for said slots and a central opening in the disc to receive a vertical drive shaft.

2. A blender according to claim 1, wherein each slot is narrow and has parallel sides before forming of said blades, terminating approximately half-way to the center of said disc.

3. A blender according to claim 1, wherein said altitude sides of said blades present edges which are substantially perpendicular to said disc and thereby form cutting and masticating edges.

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