Aug. 25, 1942. L. SEINFELD 2,294,214

SEALING MEANS

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Fig. 1

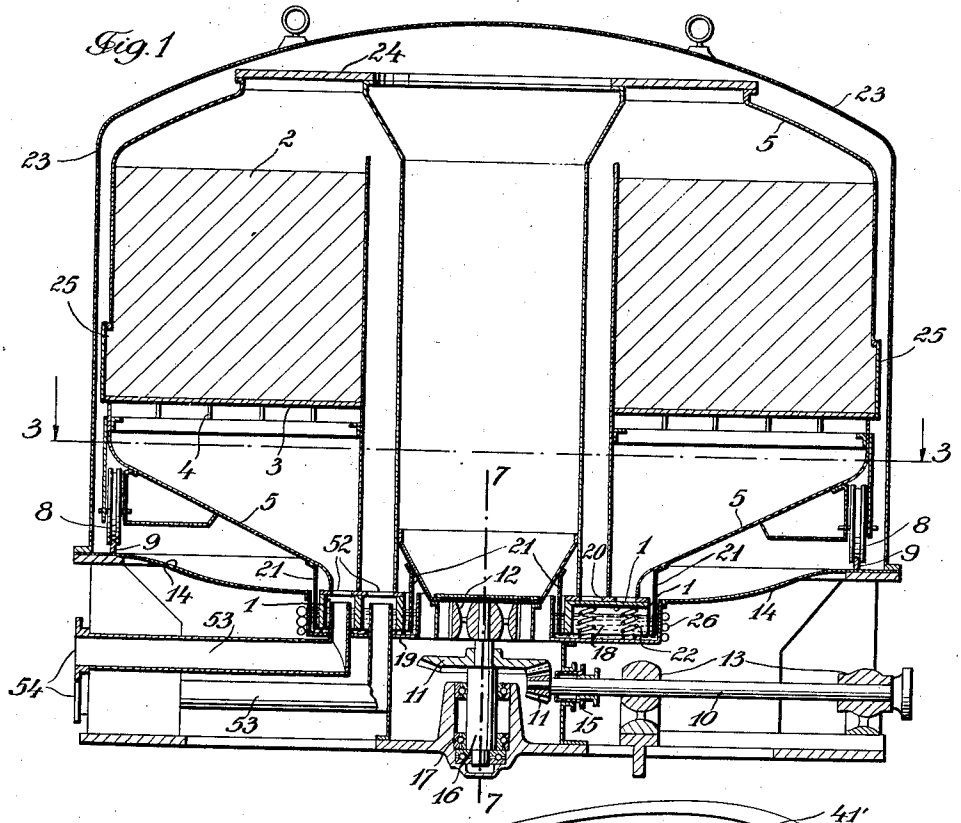
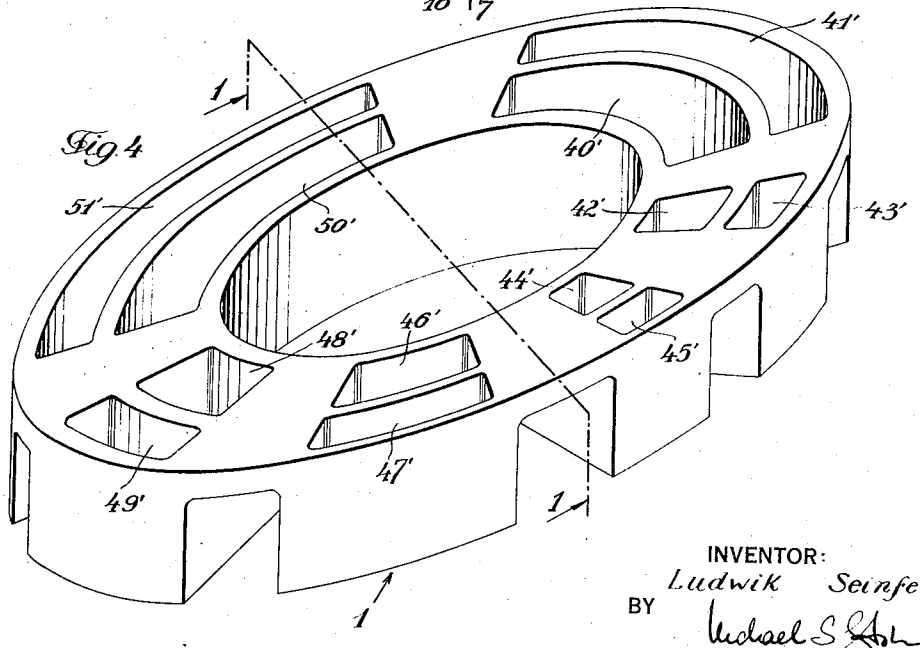


Fig. 4



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Fig. 2

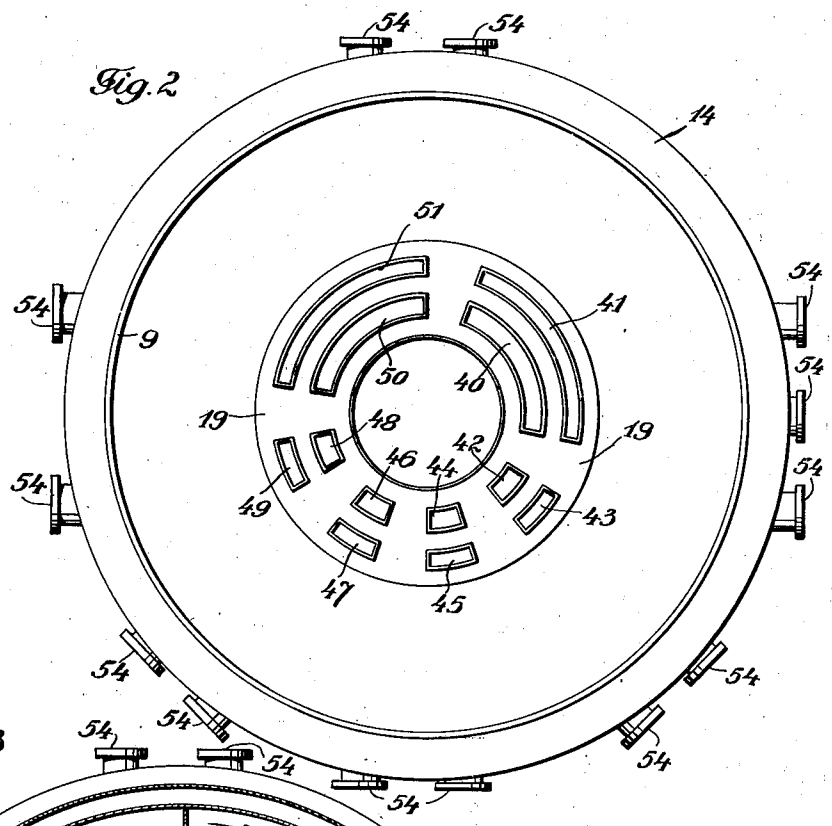
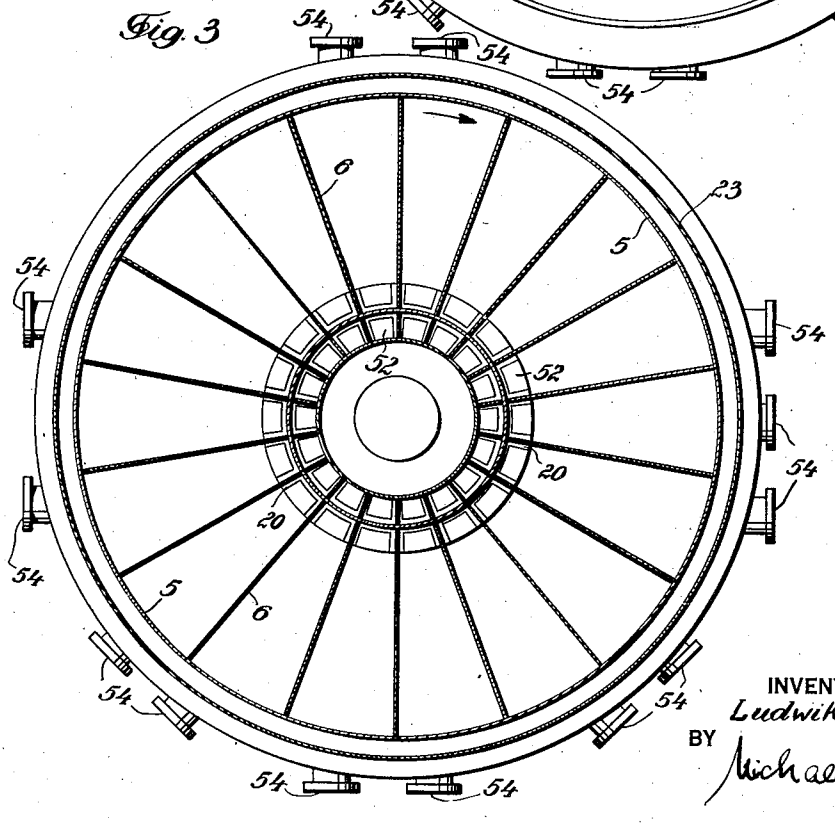


Fig. 3



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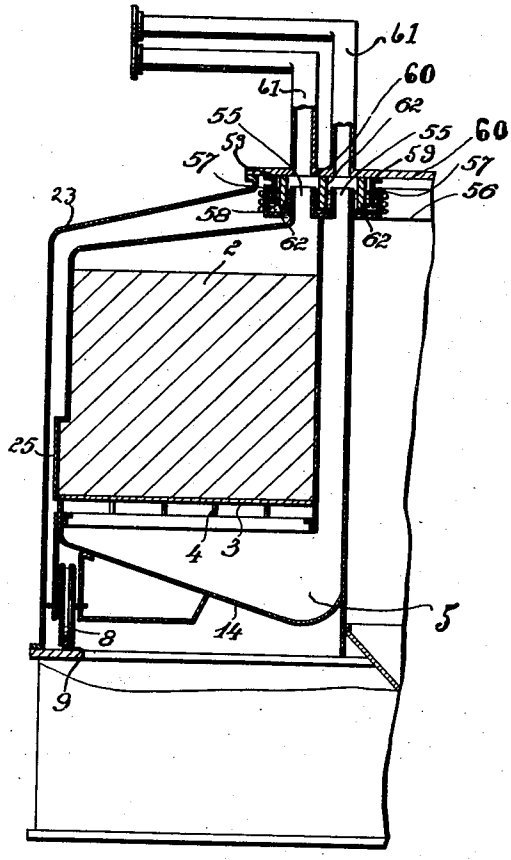


Fig. 6

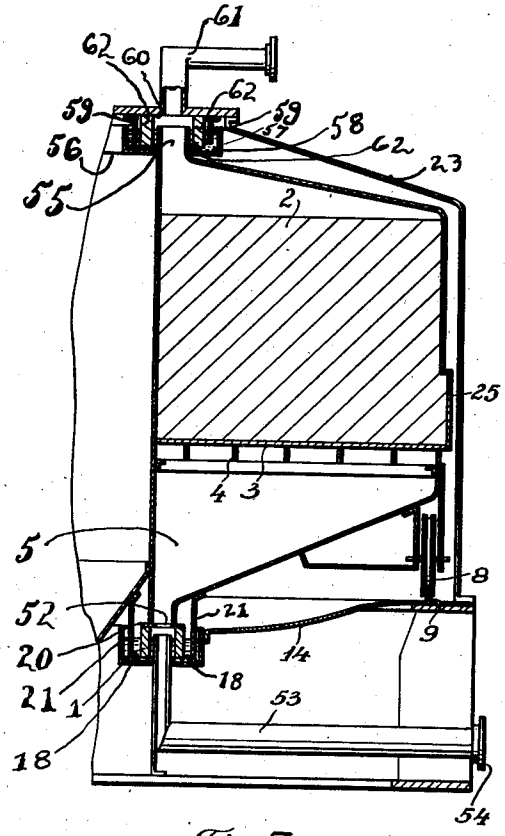


Fig. 7

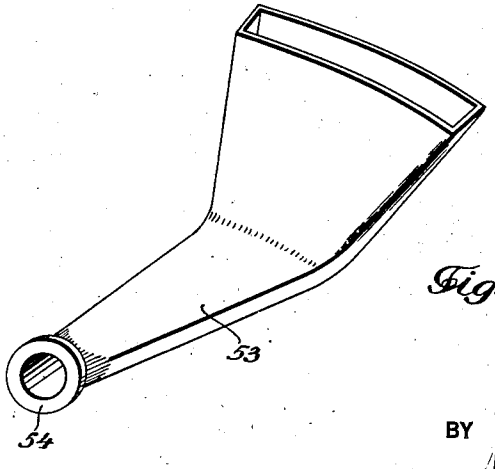


Fig. 5

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UNITED STATES PATENT OFFICE

2,294,214

SEALING MEANS

Ludwik Seinfeld, New York, N. Y.

Application July 1, 1940, Serial No. 343,427

9 Claims. (Cl. 137—111)

My present invention relates to sealing means and more particularly to means for establishing sealing relationship between a lower and an upper apparatus member constructed and arranged for the independent flow of at least one fluid or gas stream therebetween and so that one is stationary and the other movable along this stationary member.

It is the main object of my present invention to achieve even pressure over the entire sealing faces of the sealing members and so prevent formation of slits or uneven wear between the stationary apparatus member and the apparatus member moving e. g. sliding along this stationary member.

It is a further object of my present invention to attain complete and permanent sealing relationship between these apparatus members which are moving relatively to each other thereby avoiding leakage of fluids or gases through slits between the contacting faces of these members.

It is still a further object of my invention to provide sealing relationship between an annular sealing face arranged on the top of a lower apparatus member and an annular sealing face arranged at the bottom of an upper apparatus member and contacting the sealing face on the top of the lower apparatus member during rotation of one of these members about an axis normal to these sealing faces.

The manner in which above objects are attained and specific preferred embodiments of the claimed new sealing means are shown in the following detailed description and accompanying drawings to which reference will now be made.

In the drawings

Fig. 1 is a vertical section of an absorber provided with sealing means of the type claimed in the appended claims,

Figure 2 a plan view of the bed plate of the adsorber and the new liquid sealing means, shown without the rotating bowl and the pressure tight vessel,

Figure 3 a plan section of the adsorber along line 3—3 of Fig. 1,

Figure 4 a detailed view in perspective of the sealing gasket,

Figure 5 a perspective view of a stationary conduit,

Figure 6 a vertical section of a modified adsorber with inlet and outlet openings at the top of the bowl, and

Figure 7 a vertical section of a modified adsorber with inlet and outlet openings at the top and bottom of the bowl.

Similar numerals refer to similar parts throughout the several views.

In the embodiment of my new apparatus shown in Figures 1 to 3, 6 and 7 the beds of adsorbing material 2 are supported by wire cloth filter leaves 3 resting on grates 4, fixed in a circular bowl 5; this bowl is divided in a number of cells by partition walls 6. Bowl 5 rotates around the stationary axis 7—7 and is supported by rollers 8 running on rail 9. Power for rotating the bowl is transmitted through shaft 10, gear 11 and elastic clutch 12. The shaft 10 is supported by two bearings 13 and enters bed plate 14 by stuffing box 15. Shaft 16 carrying the elastic clutch 12 is supported by ball bearings 17.

As shown in Fig. 1 openings 52 are provided in the bottom wall 20 for the steam, gas and air streams entering and leaving the adsorber continuously during its rotation. The preferably finished bottom wall 20 cooperates with a fluid seal in order to prevent leakage of gases from the cells or nozzles 40—51 to the outside or from one of the openings 52 to another opening without entering the bowl. This fluid seal consists in a floating sealing gasket 1 floating in a high boiling water insoluble liquid 18 heavier than water, as for instance mercury, filling partly the substantially circular trough 19 in bed plate 14. The buoyancy provides generally the necessary pressure between the sealing gasket 1 and the finished bottom wall or base plate 20 of the rotating bowl for effectively sealing inlet from outlet of each cell as well as one group of cells from another where necessary. Leakage of gas to the outside is prevented by circular baffles 21 welded to the bowl 5 and dipping into the liquid 18 which thus acts as liquid seal. In applications of this process where only low sealing liquid depth is required, or when a sealing liquid of low specific gravity must be chosen, the necessary pressure of the floating gasket 1 against base plate 14 is secured by springs 22 submerged in the sealing liquid and arranged under the floating gasket.

When gas pressure inside the rotating bowl 5 exceeds the counter pressure of the depth of the liquid seal 18 the rotating parts of the adsorber and the liquid seal are encased in a pressure-tight vessel 23 screwed to the bed-plate. By keeping the space between vessel 23 and bowl 5 at approximately the same pressure as prevailing in the gas streams passing through the bowl

5 trouble free functioning of the liquid seal can be assured.

The sealing gasket can be constructed of two or more parts to reduce manufacturing costs.

The adsorbent material 2 is filled into the bowl 5 through openings on top of the bowl covered by plate 24 and discharged by handholes 25 when necessary.

Cooling coils 26 welded to the trough 19 in bed-plate 14 prevent evaporation of the sealing liquid.

A preferred embodiment of this gasket is shown in Fig. 4.

As shown in Fig. 5 each of the stationary conduits serving as inlet and outlet for the gas, air and steam streams has the shape of a conical pipe 53 ending at its one end in a circular opening 54 and at its other end in one of the arch-shaped nozzles 40—51 adapted to cooperate with corresponding openings or channels 40'—51' in sealing gasket 1. Thus the entering gas streams are evenly distributed over the openings 52 of the cells.

The construction of the adsorber can of course be either reversed by fixing the nozzles for gas, steam and air inlet and outlet to a top-cover or altered in such a way that bed-plate as well as top-cover are provided with said nozzles. Thus in Fig. 6 an adsorber is shown having inlet and outlet openings at the top of the bowl. In this case nozzles 55 are fixed to the top-cover 56 of the bowl, furthermore a trough 57 is secured to top-cover 56 and rotates together with the bowl. This trough 57 is partly filled with sealing liquid 58 and a circular sealing gasket 62 is floating in this liquid. This sealing gasket has a similar shape as the gasket 1 provided for the adsorber with nozzles in the bed-plate, shown in Fig. 1.

The nozzles 55 which are fixed to the top-cover 56 of the bowl reach into the channels of this gasket thereby compelling this gasket to rotate together with the bowl. By the sealing fluid the gasket is pressed against a stationary packing plate 60 having a finished surface, connected with the stationary conduits 61, sealing thereby one conduit from the other. Furthermore baffle plates 59 are fixed to this stationary packing plate 60; these baffles dip into the sealing liquid 58 in the rotating trough 57 thereby preventing leakage of gases from the cells or conduits to the outside.

Furthermore it is also possible to provide an adsorber with combined inlet and outlet openings in the top and the bottom of the bowl, as shown in Fig. 7. The construction and arrangement of the fluid seals i. e. the troughs, the gaskets and the baffles being similar to the gaskets and baffles described in connection with the adsorber shown in Figs. 1 and 6, a detailed description seems unnecessary. The construction of the fluid seal in the bottom corresponds to the construction shown in Fig. 1, and that of the fluid seal in the top of the bowl to the construction shown in Fig. 6.

Without further analysis, the foregoing will so fully reveal the gist of my invention that others can by applying current knowledge readily adapt it for various applications without omitting features, that, from the standpoint of the prior art, fairly constitute essential characteristics of the generic or specific aspects of this invention, and therefor such adaptations should and are intended to be comprehended within the meaning and range of equivalency of the following claims.

What I claim as new and desire to secure by Letters Patent is:

1. Means for establishing sealing relationship between a lower and an upper apparatus member between which members at least one fluid or gas stream passes, one of said apparatus members being stationary while the other is movable along said stationary apparatus member, said sealing means comprising in combination a horizontal flat sealing face at the bottom of said upper apparatus member, a vessel secured to the upper part of said lower apparatus member under the sealing face of said upper apparatus member, said vessel being open at the top and closed at the walls and the bottom, a sealing liquid in said vessel, and an intermediate sealing member provided at its top with a substantially flat sealing face said sealing faces at the bottom of said upper apparatus member and on the top of said intermediate sealing member surrounding the path of said fluid or gas stream or streams between the lower and upper apparatus members, said intermediate sealing member floating in said sealing liquid and being buoyed up by said liquid with a force sufficient to press the sealing face of said intermediate sealing member against the horizontal sealing face at the bottom of the upper apparatus member and to establish thereby permanent sealing relationship between said lower and upper apparatus member.

2. Means for establishing sealing relationship between a lower and an upper apparatus member between which members at least one fluid or gas stream passes, one of said apparatus members being stationary while the other is rotatable along said stationary apparatus member, said sealing means comprising in combination a horizontal, substantially annular, flat sealing face at the bottom of said upper apparatus member, said sealing face being arranged coaxially with the axis of rotation of the rotatable member, a substantially annular channel-shaped vessel secured coaxially with the axis of rotation of the rotatable member to the upper part of said lower apparatus member under the sealing face of said upper apparatus member, said vessel being open at the top and closed at the walls and the bottom, a sealing liquid in said vessel, and an intermediate sealing member provided at its top with a substantially flat sealing face said sealing faces at the bottom of said upper apparatus member and on the top of said intermediate sealing member surrounding the path of said fluid or gas stream or streams between the lower and upper apparatus members, said intermediate sealing member floating in said sealing liquid and being buoyed up by said liquid with a force sufficient to press the sealing face of said intermediate sealing member against the horizontal sealing face at the bottom of the upper apparatus member and to establish thereby permanent sealing relationship between said lower and upper apparatus member.

3. Means for establishing sealing relationship between a lower and an upper apparatus member between which members at least one fluid or gas stream passes, one of said members being stationary while the other is rotatable about a vertical axis along said stationary apparatus member, said sealing means comprising in combination a horizontal, substantially annular, flat sealing face at the bottom of said upper apparatus member arranged substantially coaxially with the axis of rotation of the rotatable member, an annular channel-shaped vessel secured

in horizontal position to the upper part of said lower apparatus member under the horizontal annular sealing face of said upper apparatus member, said channel-shaped vessel being open at the top and closed at the walls and the bottom, a sealing liquid in said vessel, and an annular intermediate sealing member provided at its top with a substantially flat sealing face said sealing faces at the bottom of said upper apparatus member and on the top of said intermediate sealing member surrounding the path of said fluid or gas stream or streams between the lower and upper apparatus members, said intermediate sealing member floating in said sealing liquid and being buoyed up by said liquid with a force sufficient to press the sealing face of said intermediate sealing member against the horizontal sealing face at the bottom of the upper apparatus member and to establish thereby permanent sealing relationship between said lower and upper apparatus member.

4. Means for establishing sealing relationship between a lower and an upper apparatus member between which members at least one fluid or gas stream passes, one of said member being stationary while the other is rotatable about a vertical axis along said stationary apparatus member, said sealing means comprising in combination a horizontal, substantially annular, flat sealing face at the bottom of said upper apparatus member arranged substantially coaxially with the axis of rotation of the rotatable member, an annular channel-shaped sealing trough secured in horizontal position to the upper part of said lower apparatus member under the horizontal annular sealing face of said upper apparatus member, said channel-shaped trough being open at the top and closed along the walls and the bottom, a sealing liquid in said trough, and an annular channel-shaped sealing gasket being open at its bottom, closed along its walls and top, and provided on its top with a substantially flat sealing face, said sealing faces at the bottom of said upper apparatus member and on the top of said annular sealing gasket surrounding the path of said fluid or gas stream or streams between the lower and upper apparatus members, said sealing gasket floating in said sealing liquid in said trough and being buoyed up by said liquid with a force sufficient to press the sealing face of said sealing gasket against the horizontal sealing face at the bottom of the upper apparatus member and to establish thereby permanent sealing relationship between said lower and upper apparatus member during rotation of one of said members..

5. Sealing means for use between a lower and an upper apparatus member, each of which is provided with conduits, and one of which is stationary while the other is rotatable about a vertical axis, said sealing means comprising in combination a horizontal, substantially annular flat sealing face at the bottom of said upper apparatus member arranged coaxially with the axis of rotation of the rotatable apparatus member, openings in said sealing face connected with said conduits in said upper apparatus member, an annular channel-shaped trough secured in horizontal position to the upper part of said lower apparatus member parallel to and under the horizontal annular sealing face of said upper apparatus member, sealing liquid in said trough, nozzles connected to said conduits in said lower apparatus member, said nozzles passing through the bottom of said trough and reaching above the level of the sealing liquid in said trough, and an annular sealing gasket having on its top a substantially flat sealing face and floating in said sealing liquid and being buoyed up by the same with a force sufficient to press the sealing face of said sealing gasket against the sealing face on the upper apparatus member and to establish thereby sealing relationship between said sealing faces, said sealing gasket being provided with passages connecting the gasket bottom with said sealing face on the top of said gasket and being arranged in said trough in such a manner that said nozzles in said trough reach into said passages from their bottom ends.

6. In sealing means of the type claimed in claim 5, said openings in the annular sealing face at the bottom of the upper apparatus member and said openings in the annular sealing face at the top of the floating sealing gasket being arranged spaced from the inner and outer circular edges of said sealing faces along circles of equal diameters.

7. In sealing means of the type claimed in claim 5, the annular sealing face at the bottom of the upper apparatus member and the annular sealing face on top of said floating sealing gasket being of substantially equal size and arranged superimposed one upon another coaxially with the axis of rotation of the rotatable apparatus member.

8. In combination with sealing means of the type claimed in claim 5, a circular baffle plate secured to the upper apparatus member coaxially with the axis of rotation of the rotatable member, said baffle plate reaching into the sealing liquid in the sealing trough secured to the lower apparatus member.

9. In combination with sealing means of the type claimed in claim 5, inner and outer baffle plates secured to the sealing face of the upper apparatus member coaxially with the axis of rotation of the rotatable member, said inner baffle plate having an outer diameter being smaller than the inner diameter of said annular sealing gasket and said outer baffle plate having an inner diameter being larger than the outer diameter of said gasket, both baffle plates arranged reaching into the sealing liquid in said sealing trough, so that said annular sealing gasket is floating in a ring-shaped space, the bottom of which is formed by the sealing liquid, the walls by said baffle plates, and the top by the sealing face of the upper apparatus member.

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