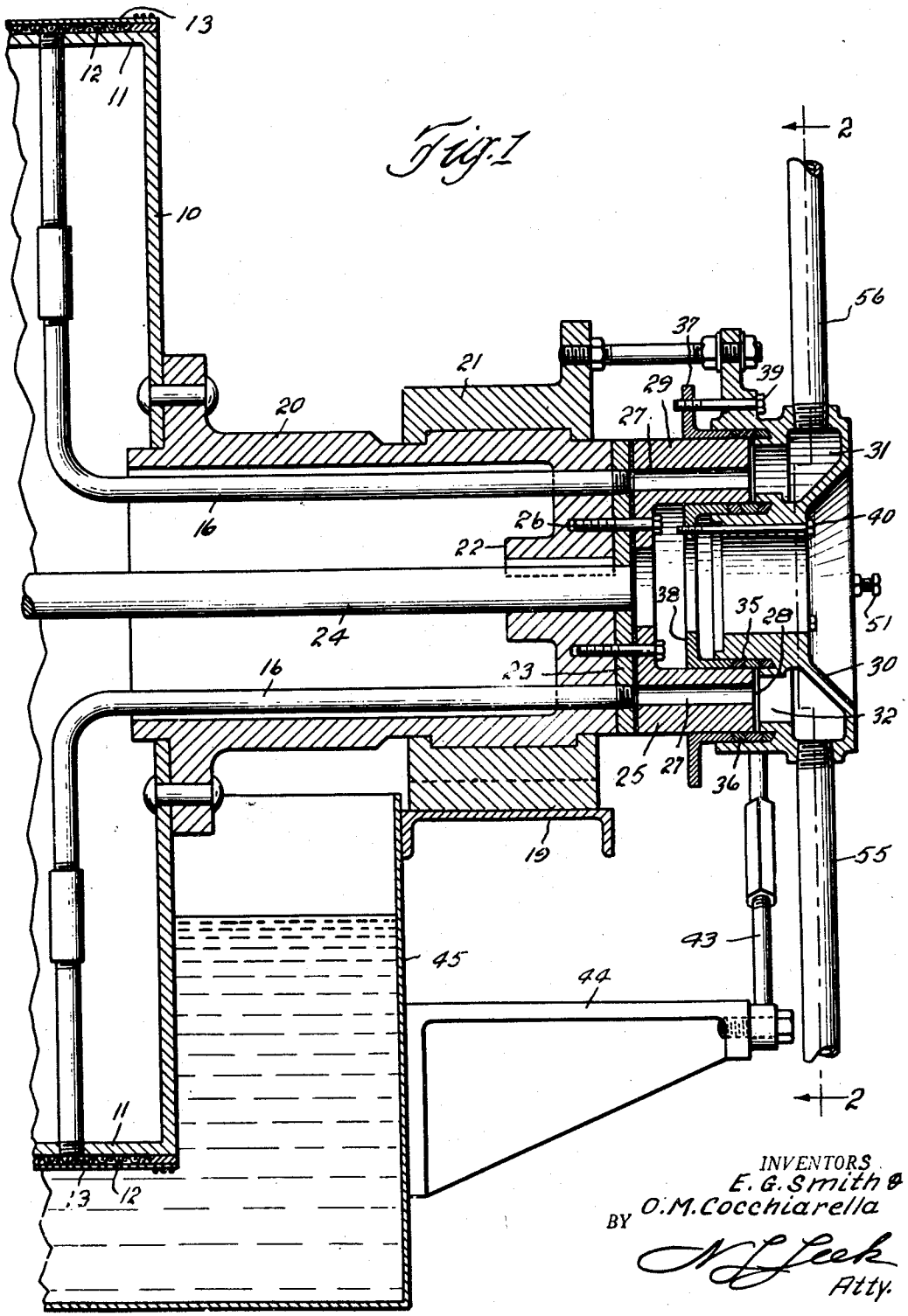
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ROTARY FILTER

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Fig. 1



INVENTORS
E. G. Smith &
BY O. M. Cocchiarella
N. L. Peek
Atty.

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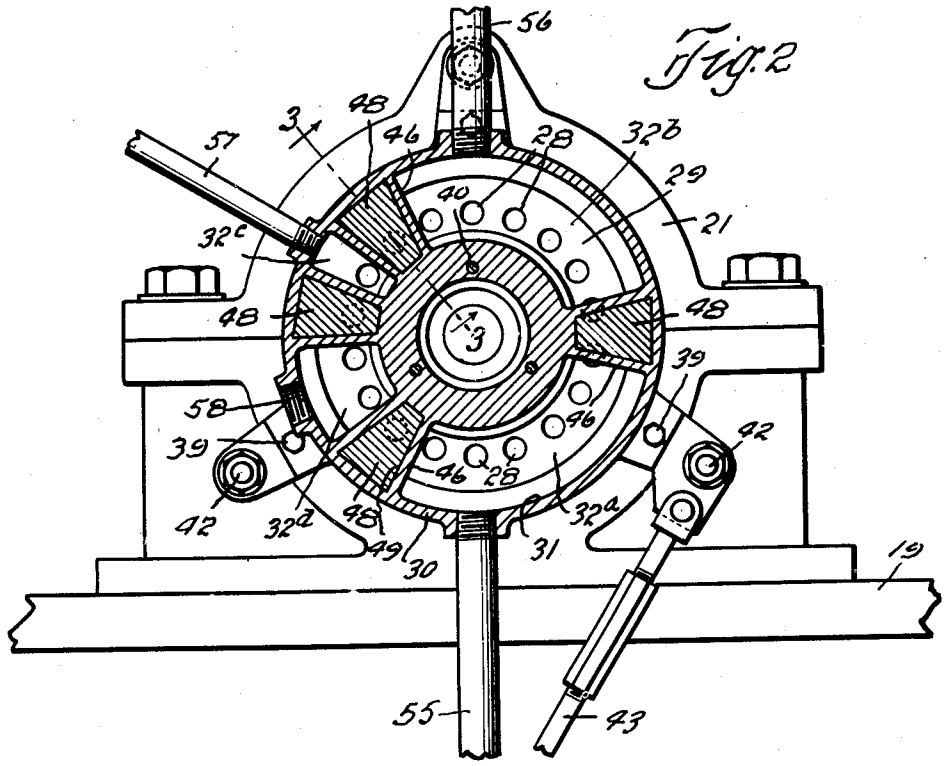


Fig. 2

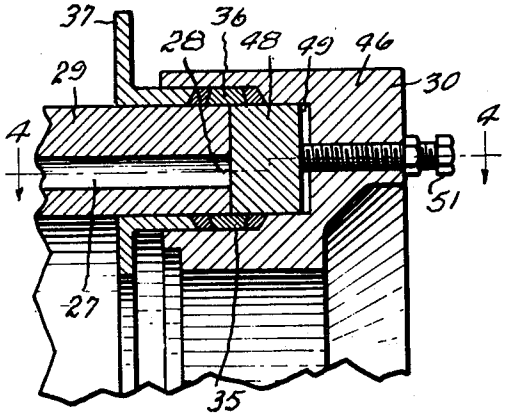


Fig. 3

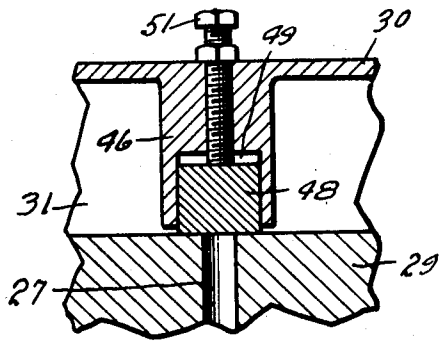


Fig. 4

INVENTORS
E. G. Smith &
BY O. M. Cocchiarella
A. J. Leek
Atty.

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UNITED STATES PATENT OFFICE

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ROTARY FILTER

Edmund G. Smith, Cedar Grove, and Otell M. Cocchiarella, Newark, N. J., assignors to Equipment Development Co., Inc., Montclair, N. J., a corporation of New Jersey

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3 Claims. (Cl. 251—87)

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This invention relates to rotary filters or thickeners and more particularly to a valve for controlling the filtering or thickening cycle of such apparatus.

An object of the invention is to provide a valve of the above type having novel and improved details of construction and features of operation.

Another object is to provide a valve of the above type in which moving metal-to-metal surfaces are eliminated.

Another object is to provide a novel and improved valve of the above type in which friction and wear are reduced to a minimum.

Another object is to provide a valve of the above type in which the wearing surfaces may be readily replaced.

Various other objects and advantages will be apparent as the nature of the invention is more fully disclosed.

The valve, in accordance with the present invention, is particularly adapted for use with rotary filters or thickeners of the type having a plurality of sections connected by individual pipes to ports in the rotating part of the valve. These ports are connected successively at different stages of the filtering or thickening cycle, to suction, pressure or atmosphere. For example, during a portion of the cycle suction may be applied to the filter section for the purpose of drawing the liquid therethrough and depositing a filter cake thereon. During another portion of the cycle the filter cake may be removed from the liquid and a higher suction applied for drying or dewatering the same. The suction may then be removed and pressure applied for dislodging the filter cake. Thereafter the section may be vented to the atmosphere and the cycle repeated.

The present valve is accordingly designed to operate automatically for connecting the filter sections successively to the various sources of suction or pressure as required during the rotation of the filter.

In one embodiment of the present invention the valve comprises a stationary housing having an annular channel therein opening in a radial face of the housing. The rotary member comprises an annular flange on the hub of the filter terminating in a radial face seated within the stationary annular chamber, but out of metal-to-metal contact therewith. Packing glands effect a seal at each side of the annular channel and radial internal flanges formed in the channels divide the same into a plurality of separate segmental chambers to which the suction and pressure sources are connected. The radial flanges are spaced from the radial face of the annular flange and

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are sealed thereto by blocks of plastic material mounted in recesses in the flanges and held in sealing contact with such faces.

The arrangement is such that the wear is confined to the plastic blocks which may be readily removed and renewed. At the same time the chambers are effectively sealed.

Although the novel features which are characteristic of this invention are pointed out more particularly in the claims, the nature of the invention will be better understood by referring to the following description, taken in connection with the accompanying drawings, in which a specific embodiment thereof has been set forth for purposes of illustration.

In the drawings:

Fig. 1 is a vertical section through a portion of a rotary filter showing the present valve applied thereto;

Fig. 2 is a transverse section taken on the line 2—2 of Fig. 1;

Fig. 3 is a partial section taken on the line 3—3 of Fig. 2; and

Fig. 4 is a section taken on the line 4—4 of Fig. 3.

Referring to the drawings more in detail, the invention is shown as applied to a rotary filter comprising a drum 10 having a peripheral wall 11 carrying a suitable layer of spacing material 12 and a filter medium 13, such as a filter cloth. The drum is divided peripherally into into a plurality of sections to each of which is connected a pipe 16, two of which are shown in Fig. 1.

The drum 10 is provided with a hub 20 which is journalled for rotation in a stationary bearing 21 and terminates in an end member 22 carrying a spacer plate 23. The bearing 21 is mounted on a bracket 19 attached to the tank wall 45 of the filter. A drive shaft 24 extends through the hub 20 and is attached to the end member 22. The pipes 16 also extend through the hub 20 and are secured at their ends in the spacer plate 23.

A rotary valve member 25 is attached to the end member 22 by bolts 26 which extend through the valve member 25 and through the spacer plate 23. The valve member 25 includes an annular flange 29 through which a plurality of ducts 27 extend, which register with the various pipes 16 and terminate in ports 28 disposed annularly around the radial surface of the flange 29.

The stationary valve member comprises a housing 30 having an annular chamber 31 formed therein communicating with an annular passage 32 into the end of which the flange 29 extends. The adjacent surfaces of the housing 30 and flange 29, however, are spaced to provide running

clearance and to prevent metal-to-metal contact between the relatively rotating parts.

For sealing the opposite peripheral surfaces of the rotating flange 29 a pair of annular packing glands 35 and 36 are provided which are secured by follower rings 37 and 38. The ring 37 is journalled on the outside of the flange 29 and is secured to the housing 30 by means of bolts 39. The ring 38 is journalled within the flange 29 and is secured by bolts 40. The housing 30 is rigidly attached to the stationary bearing 21 by means of a plurality of tie-bolts 42 and is further anchored against rotation by a tie-rod 43 which engages a stationary bracket 44, attached to the tank 45.

Referring to Fig. 2 the annular chamber 31 is divided into a plurality of isolated sections by means of radial flanges 46 which close the chamber 31 and passage 32, but are spaced from the end of the flange 29 so as to avoid metal-to-metal contact. Sealing members, such as blocks 48 of plastic or other relatively soft material, are slidably held in recesses 49 (Figs. 3 and 4) formed in the flanges 46 and are held in pressure engagement with the end of the rotating flange 29 by means of adjustable bolts 51.

The flanges 46 and blocks 48 form a complete seal across the annular chamber 31 and thereby divide the same into a plurality of separate arcuate chambers indicated in Fig. 2 as chambers 32*a*, 32*b*, 32*c* and 32*d*. A suction pipe 55 extends through the housing 30 into communication with the chamber 32*a*. This pipe may for example serve as the filtrate removal pipe. A suction pipe 56, similarly communicates with the chamber 32*b*. This pipe may carry a higher suction than the pipe 55 and may be adapted to remove water from the filter cake after the latter has been removed from the solution. A pressure pipe 57 communicates with the chamber 32*c* and air vent 58 communicates with the chamber 32*d*.

In the operation of this device, as the drum 10 rotates, the various ports 28 are brought successively into registration with the chambers 32*a* to 32*d*, rotation being assumed to be in a counterclockwise direction as seen in Fig. 2. For filtering purposes the port 28 registers with the suction chamber 32*a* during the period when the corresponding filter sections are immersed. During this period, the filtrate is drawn through the filter cloth and a filter cake is deposited thereon. As the rotation continues, the ports 28 are brought into registration with the chamber 32*b* after the filter cake has been lifted out of the solution. During this stage, suction is applied to dewater the filter cake. The comparatively dry filter cake thereupon reaches the position corresponding to the chamber 32*c* wherein pressure is applied in back of the filter cloth to loosen the cake and remove the same. Before the corresponding sections again dip into the liquid, the ports 28 register with the chamber 32*d* which vents the filter sections to remove the pressure which was applied thereto and conditions the same to receive suction when the ports 28 again reach the chamber 32*a*.

It will be noted that the metal rotating valve flange 29 does not contact the metal housing 30 although a complete seal is effected by the packing glands 35 and 36 and by the various blocks 48. Both the blocks and the glands may of course be readily renewed as required. The blocks 48 are preferably made of a plastic material which is capable of forming an effective seal and withstanding wear, but is not sufficiently hard to cause wear on the contacting surface of the rotary flange 29.

When the suction is applied to the valve through the pipes 55 and 56 a force is developed which tends to cause the surfaces of the members 25 and 30 to make contact. However, such contact is prevented by the tie-bolt 42 which positively positions the housing 30 and prevents any movement thereof in response to suction within the various chambers. The anchor 43 takes up the torque produced by the blocks 48 and thereby prevents a bending movement from being applied to the tie-bolts 42.

Although a specific application of the valve has been shown for purposes of illustration, it is to be understood that the valve is not to be restricted thereto but may be adapted to various uses as will be readily apparent to a person skilled in the art. The invention is only to be restricted in accordance with the scope of the following claims.

What is claimed is:

1. A rotary valve comprising a stationary member and a rotary member having registering radial faces, an annular port in one face, registering port means in the other face, packing glands on each side of said annular port in sealing engagement with the opposite face, and baffle means in said annular port dividing the same into a plurality of chambers, said baffle means comprising a block slidably secured in said port and held in sealing engagement with the opposite face.

2. A rotary valve comprising a stationary member and a rotary member, an annular flange on one member and a corresponding annular channel in the other member, packing glands on opposite sides of said flange in sealing engagement with said channel, said members having respectively an annular port and an annularly disposed ring of ports disposed in the registering faces of said flange and said channel, and baffle means in said annular port dividing the same into a plurality of chambers, said baffle means comprising a block slidably held in said port in sealing engagement with the opposed face.

3. A rotary valve comprising a housing having an annular chamber therein and an annular passage extending axially therefrom and opening in a radial face of said housing, a relatively rotatable member having an annular flange journalled in said passage and having a radial face with distributed port means therein communicating with said passage, packing glands disposed between the registering peripheral faces of said flange and passage and baffle means disposed in said annular chamber to divide the same into a plurality of arcuate chambers, said baffle means comprising flanges extending across said annual chamber and passage, but terminating in spaced relationship from said opposite radial face, recesses in said radial flanges, blocks slidably held in said recesses, and means holding said blocks in sealing engagement with said radial face.

EDMUND G. SMITH.
OTELL M. COCCHIARELLA.

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