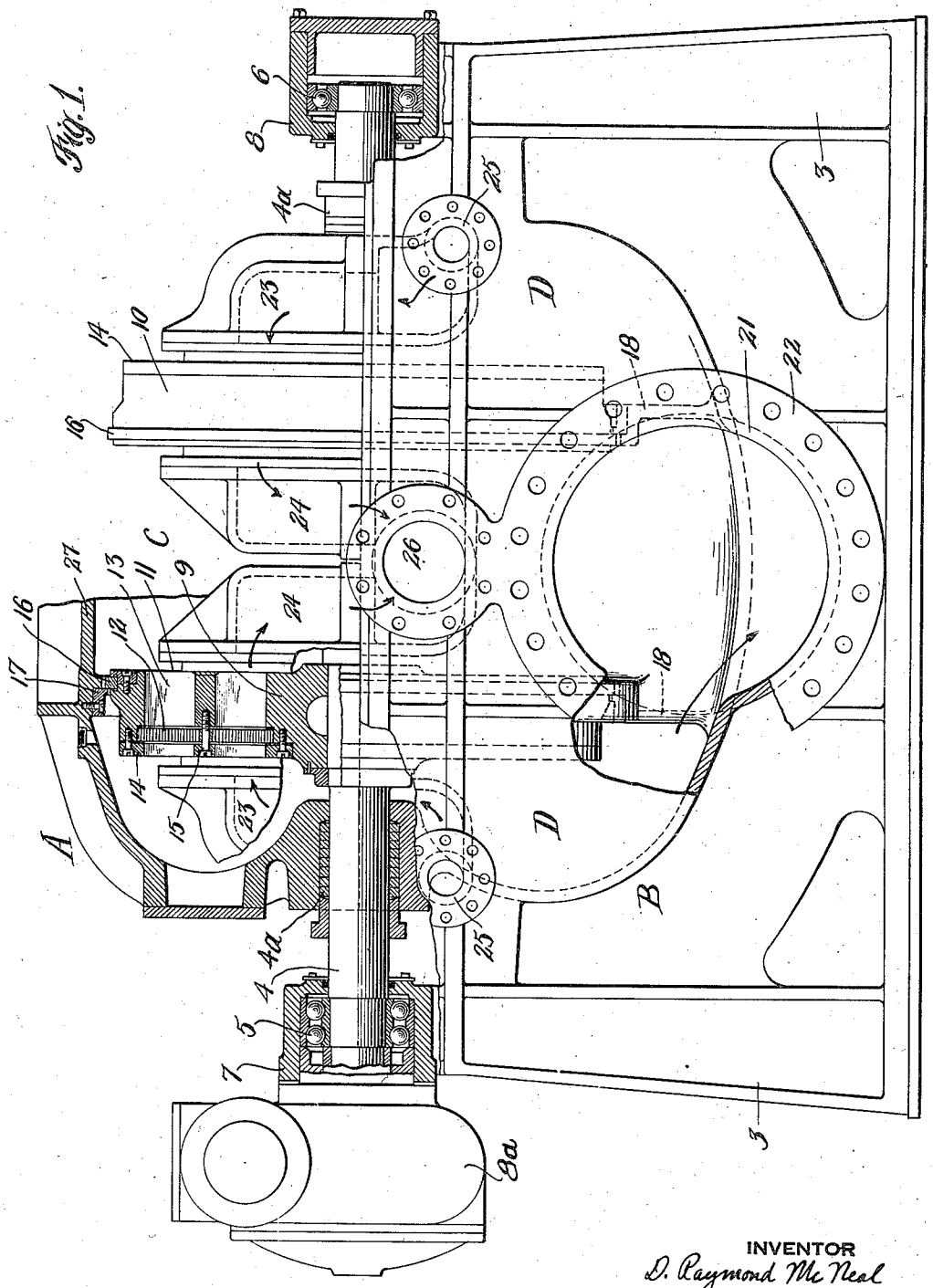
Dec. 28, 1937. D. R. McNEAL 2,103,483

ROTARY STRAINER

Filed Nov. 30, 1935 2 Sheets-Sheet 1

Fig. 1.



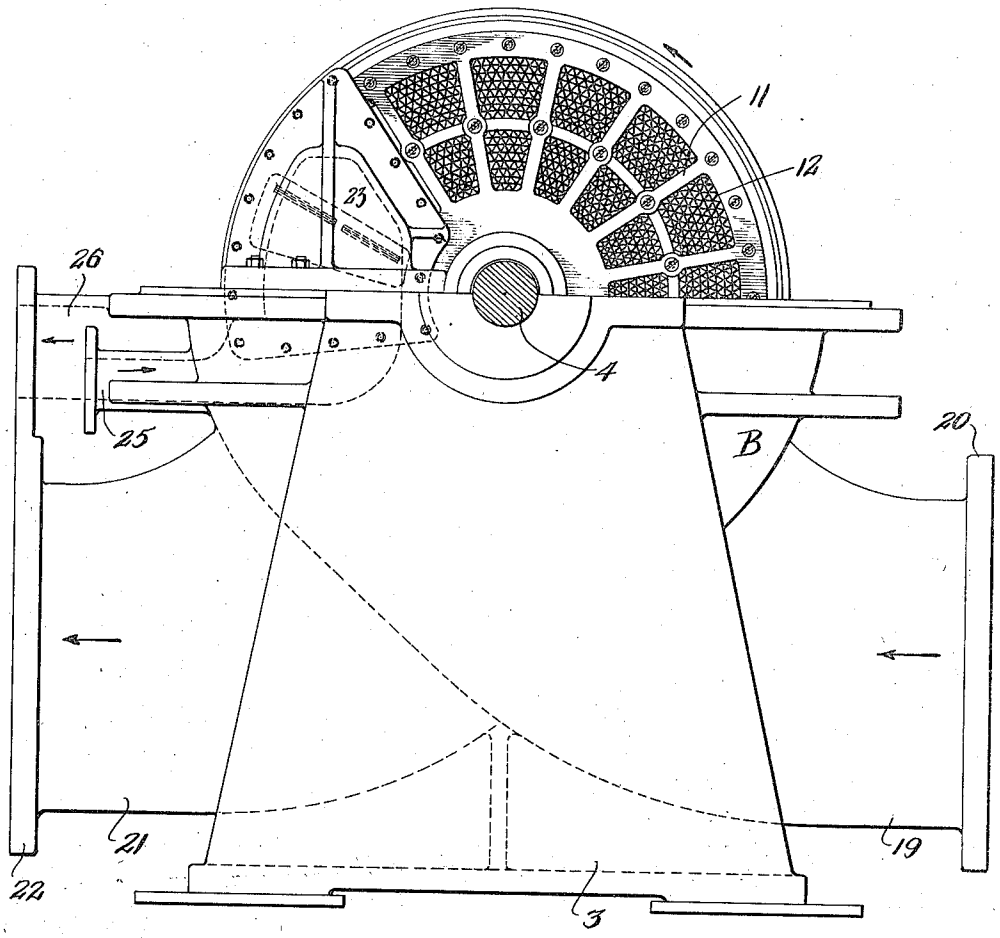
INVENTOR
D. Raymond McNeal
BY
Symmestedt & Lechner
ATTORNEYS

Dec. 28, 1937. D. R. McNEAL 2,103,483

ROTARY STRAINER

Filed Nov. 30, 1935 2 Sheets-Sheet 2

Fig. 2.



INVENTOR
D. Raymond McNeal
BY
Symmetwed & Lechner
ATTORNEYS

Patented Dec. 28, 1937 2,103,483

UNITED STATES PATENT OFFICE

2,103,483

ROTARY STRAINER

Daniel Raymond McNeal, Abington, Pa., assignor to Andale Company, Philadelphia, Pa., a corporation of Pennsylvania

Application November 30, 1935, Serial No. 52,288

5 Claims. (Cl. 210—196)

This invention relates to rotary strainers and is especially concerned with an improved continuously operable strainer of the disk type.

One of the primary objects of the invention is to reduce distortion and swelling of the strainer casing which at times has occurred when employing the strainer to treat a fluid at relatively high pressure.

Another object of the invention is to dispose the strainer parts in such manner as to produce a "balanced condition", the nature of which is more fully described hereinafter but which is of importance in reducing thrust loads and minimizing the tendency for the strainer rotor to act as a ram or piston.

The present invention is also of advantage since a given straining area may be secured with rotating strainer parts of smaller diameter than with prior devices having an equivalent straining area. In addition the invention may also permit the use of rotating strainer parts of larger diameter without encountering certain difficulties which were heretofore incident to devices of large diameter.

Another object of the invention is to make practicable the use of exceedingly fine straining elements even in a strainer disk of relatively large diameter while overcoming distortion and swelling of the strainer casing which has heretofore been a serious difficulty.

Still further the invention has in view facilitation of the discharge of debris, the elimination of strains such as would result in jamming or binding of the parts, and simplification of the bearings and other structure of the strainer.

How the foregoing, together with such other objects and advantages as may hereinafter appear, or are incident to my invention, are realized, is more fully described herebelow in connection with the accompanying drawings, in which—

Figure 1 is a front elevational view of a strainer constructed in accordance with my invention, certain parts being broken away and shown in section; and

Figure 2 is an end view looking toward the left in Figure 1, with the upper portion of the casing removed.

The strainer may conveniently be supported as by framing or standards 3—3, and in general comprises upper and lower casing parts A and B in which the rotor shaft 4 is mounted. While the supporting structure and the lower casing part B might be separately fabricated, as herein shown they are preferably cast as a unit in order to afford maximum rigidity, especially with respect to the bearings 5 and 6 for the shaft 4, these bearings being mounted in boxes 7 and 8, respectively, which are mounted on a portion of the supporting framing. A mechanism 8a, shown in outline in Figure 1, serves to drive the shaft 4 and thus the rotatable straining elements now to be described. Packing glands 4a are provided where the shaft 4 passes through the casing walls.

In accordance with this invention shaft 4 carries a pair of strainer wheels or disks 9, 10 which are spaced from each other. Each disk is provided with spokes 11 between which straining elements 12 are disposed, the spokes 11 being of considerably greater width than the thickness of the straining elements so as to provide pockets 13 for collecting debris or any other material which is being strained from the fluid under treatment. The nature and structure of the strainer elements 12 themselves need not be considered in detail herein, although it might be noted that these elements are preferably made up in the form of rings which are clamped between the main part of the wheel and a cooperating clamping device 14 (see Figure 1) secured to the wheel proper by means of studs 15. The hub of each strainer disk, of course, is keyed to the shaft 4.

Each strainer wheel further carries a resilient ring 16 around its periphery which is adapted to cooperate with a ring 17 carried inside of the casing for the purpose of dividing the casing into separate chambers disposed at opposite sides of each strainer disk. The rings 16 and 17 are preferably constructed and arranged substantially in the manner disclosed and claimed in my copending application Serial No. 721,447, filed April 20, 1934.

The fluid to be strained is admitted to the strainer pockets 13 which are located at the right hand side of the disk 9 in Figure 1, although it will be noted that the disk 10 is inverted so that the inlet sides of both disks face each other. By virtue of this arrangement a single inlet chamber in the casing serves to deliver the fluid to be strained to both of the strainer disks. This central inlet chamber designated by the letter C in Figure 1, is further defined by partition plates 18, 18 which, of course, are the elements with which the sealing rings 16 and 17 cooperate. The fluid to be strained is admitted to this central chamber C between the strainer disks and the partitions 18, 18 through a connection 19 (see Fig. 2), preferably formed integrally with the lower casing part B and having a flange 20 for the attachment of a pipe thereto. The two outlet chambers D, D in the casing which are positioned at the outer sides of the strainer disks 9 and 10 receive the strained fluid and these two chambers communicate and merge with an outlet connection 21 having a flange 22 for connection with the pipe.

For the purpose of removing materials or debris collected in the strainer pockets, each strainer disk is provided with an inlet and an outlet cleanout box 23 and 24, respectively, by means of which

a cleaning fluid is passed in reverse flow through a portion of the strainer elements as each disk rotates. Various details of the structure and operation of these clean-out boxes need not be fully described herein since they form no part of the present invention per se, but are described and claimed in my copending application Serial No. 657,586, filed February 20, 1933. However, it should be noted that in accordance with the present invention each clean-out box is provided with an inlet connection **25** and further that the two outlet boxes **24** are provided with a common outlet connection **26**. It should further be noted that the operation of the clean-out boxes in accordance with the copending application referred to, is similar to the action of locks, in that each section or pocket of the strainer disk is preferably completely closed off or sealed before this pocket is opened to the apertures in the clean-out boxes which serve to pass the cleaning fluid through the strainer elements. Similarly, during movement of each section or pocket out of registry with the clean-out boxes, this section is again closed off or sealed. The action, therefore, provides for the serial removal of the strainer pockets from straining service, the cleaning of the removed pocket and the subsequent return of this pocket into active straining service. In accordance with the copending application referred to, the clean-out boxes are further preferably provided with resilient facing members disposed adjacent to the side faces of the strainer disks so as to completely seal each strainer section as it moves between the clean-out boxes.

In operation the fluid to be strained is admitted to the central chamber C through the connection **19** and with regard to this central chamber it should be noted that the walls thereof are principally defined by the two strainer disks at the sides and by a substantially cylindrical wall **27** around the periphery. The substantially cylindrical shape of this wall is of material advantage in overcoming distortion and swelling of the casing, especially where high pressures are encountered. From the central chamber the fluid to be strained passes through the straining elements of the two disks into the two outlet chambers D, D and from these the strained fluid is discharged through the outlet connection **21**.

The cleaning fluid is admitted to the inlet cleaning boxes **23** through connections **25**, and after passage through the sections of the disks located at that moment between the pairs of clean-out boxes the cleaning fluid enters the outlet boxes **24** and is discharged through the single outlet connection **26**. The provision of a single outlet connection **26** for both strainer disks is of advantage not only in reducing the total number of connections which must be made, but further since an outlet connection of large diameter may be used and this is of substantial advantage in ensuring free discharge of debris.

Attention is now called to the fact that because of the employment of a pair of strainer disks with a single inlet chamber therebetween and a pair of outlet chambers at the outer sides of the disks, the tendency of the disks to act as rams or pistons is balanced, i. e., one disk balances the other, with the result that the pressure drop across each disk does not require the use of a heavy thrust bearing as heretofore in devices where only a single disk is employed. This is of further advantage in avoiding distortion and swelling of the casing since, in order to ensure proper alignment and rigidity, the bearings for the shaft **4** carrying the disks are mounted either directly on the casing or on framework or the like directly connected therewith. In prior arrangements this mounting of the bearings for the shaft resulted in the transmission of heavy thrusts from the strainer disk to the shaft, from the shaft to the thrust bearing and from the thrust bearing to the casing, with the result that the casing was distorted particularly where the fluid being strained was under relatively high pressure and where the straining elements were of relatively fine mesh.

In connection with the size of the mesh employed, several factors should be borne in mind, as follows: In the first place, where the straining or separating action required necessitates the use of very fine mesh straining elements, the pressure ordinarily must be relatively high in order effectively to carry out the separating action. Still further the pressure drop across the strainer (and thus the piston or ram action) increases as the mesh of the straining or filtering elements is decreased. However, in accordance with the present invention, by virtue of balancing the piston action of a pair of disks, one against the other, no distortion of the casing is produced, even where extremely fine filtering elements are employed, and in consequence of this the invention makes it practicable to employ a continuously operable filter or strainer of this type for certain purposes for which it was not possible to employ them heretofore.

As hereinbefore mentioned the employment of two disks is of advantage in providing a given total straining area with rotating parts of smaller diameter. The balancing of the forces on these disks may further make is practicable to employ strainer disks of larger diameter than heretofore without encountering the distortion of the casing which caused difficulties in prior devices.

From the foregoing it will be seen that the two principal causes of distortion and swelling of the casing (pressure per se and thrust on the bearings due to pressure drop across the disk) are both counteracted or compensated for in accordance with the present invention. With regard to swelling due to pressure per se two points should be noted. In the first place, because of the pressure drop across the strainer disks the pressure at the inlet side of the disk is greater than the pressure at the outlet side of the disk. In consequence the structure of the present invention is of advantage in providing a single centrally located inlet chamber for the reason that the higher pressure is thereby confined in part between the pair of disks instead of being free to act on a side wall of the casing, as has been customary in single disk devices. Secondly, by virtue of locating the inlet chamber centrally between a pair of disks, the only casing wall which is subjected to the high pressure takes the form of a substantially cylindrical wall which, as is well known, is best suited to withstand high pressure.

In conclusion it is pointed out that distortion and swelling of the casing has been a drawback of equipment of this type heretofore for a number of reasons, principally because any distortion or swelling impairs the accurate seal of the clean-out boxes against the faces of the strainer disks, producing undesirable wear or leakage. In addition, distortion impairs the seal between the periphery of the strainer disks and the inside wall of the casing. The balanced condition of the disks overcomes any tendency for the rotating

parts to move axially, which tendency would also impair the accurate seal of the clean-out boxes.

A further advantage of confining the high pressure (inlet) chamber between the two strainer disks is that this high pressure is thereby removed from the packing glands **4***a* for the shaft **4**.

I claim:

1. A rotary strainer including a rotatable axis mechanism, a pair of spaced strainer disks mounted on the axis mechanism, and a casing surrounding the strainer disks and cooperating therewith to form inlet and outlet chambers in the casing, one disposed intermediate the disks and serving as a flow chamber common to both disks and the other being divided with portions thereof disposed at the outer sides of both disks, a major part of the disk area at both sides of both disks being exposed to the adjacent chambers, inlet and outlet connections for introducing fluid to be strained into and for withdrawing the same from the inlet and outlet chambers, whereby to provide for flow of materials to be strained through the disks generally axially thereof but in opposite axial directions, a mechanism for cleaning the strainer disks, including cleaning boxes positioned at opposite sides of both disks, the boxes for each disk being circumferentially located in substantially the same position whereby to provide for flow of a cleaning medium from the box at one side of the disk through the disk to the box at the opposite side of the disk, and connections for a cleaning fluid associated with said boxes to provide for flow of cleaning fluid through the disks in a direction opposite to the flow therethrough of the fluid being strained.

2. A rotary strainer including a rotatable axis mechanism, a pair of spaced strainer disks mounted on the axis mechanism, and a casing surrounding the strainer disks and cooperating therewith to form inlet and outlet chambers in the casing, one disposed intermediate the disks and serving as a flow chamber common to both disks and the other being divided with portions thereof disposed at the outer sides of both disks, a major part of the disk area at both sides of both disks being exposed to the adjacent chamber, inlet and outlet connections for introducing fluid to be strained into and for withdrawing the same from the inlet and outlet chambers, there being a connection common to the chambers at the outer sides of the disks, whereby to provide for flow of materials to be strained through the disks generally axially thereof but in opposite axial directions, a mechanism for cleaning the strainer disks, including cleaning boxes positioned at opposite sides of both disks, the boxes for each disk being circumferentially located in substantially the same position whereby to provide for flow of a cleaning medium from the box at one side of the disk through the disk to the box at the opposite side of the disk, and connections for a cleaning fluid associated with said boxes to provide for flow of cleaning fluid through the disks in a direction opposite to the flow therethrough of the fluid being strained.

3. A rotary strainer including a rotatable axis mechanism, a pair of spaced strainer disks mounted on the axis mechanism, and a casing surrounding the strainer disks and cooperating therewith to form inlet and outlet chambers in the casing, one disposed intermediate the disks and serving as a flow chamber common to both disks and the other being divided with portions thereof disposed at the outer sides of both disks, a major part of the disk area at both sides of both disks being exposed to the adjacent chamber, inlet and outlet connections for introducing fluid to be strained into and for withdrawing the same from the inlet and outlet chambers, whereby to provide for flow of materials to be strained through the disks generally axially thereof but in opposite axial directions, a mechanism for cleaning the strainer disks, including cleaning boxes positioned at opposite sides of both disks, the boxes for each disk being circumferentially located in substantially the same position whereby to provide for flow of a cleaning medium from the box at one side of the disk through the disk to the box at the opposite side of the disk, and connections for a cleaning fluid associated with said boxes to provide for flow of cleaning fluid through the disks in a direction opposite to the flow therethrough of the fluid being strained, there being a cleaning fluid connection common to the cleaning boxes intermediate the two disks.

4. A rotary strainer including a casing a rotatable axis mechanism, a pair of strainer disks mounted in the casing on the axis mechanism in spaced relation and cooperating with the casing to divide the same into a central inlet chamber located between the disks and a pair of outlet chambers located at the outer sides of the disks, to which inlet and outlet chambers a major portion of the disk area of both sides of both disks is exposed, means for introducing a fluid to be strained into the inlet chamber, means for discharging the strained fluid from the outlet chambers, a mechanism for cleaning the strainer disks, including cleaning boxes positioned at opposite sides of both disks, the boxes for each disk being circumferentially located in substantially the same position whereby to provide for flow of a cleaning medium from the box at one side of the disk through the disk to the box at the opposite side of the disk, and connections for a cleaning fluid associated with said boxes to provide for flow of cleaning fluid through the disks in a direction opposite to the flow therethrough of the fluid being strained.

5. A rotary strainer including a rotatable axis mechanism, a pair of spaced strainer disks mounted on the axis mechanism, and a casing surrounding the strainer disks and cooperating therewith to form inlet and outlet chambers in the casing, one disposed intermediate the disks and serving as a flow chamber common to both disks and the other being divided with portions thereof disposed at the outer sides of both disks, a major part of the disk area at both sides of both disks being exposed to the adjacent chambers, inlet and outlet connections for introducing fluid to be strained into and for withdrawing the same from the inlet and outlet chambers, whereby to provide for flow of materials to be strained through the disks generally axially thereof but in opposite axial directions, and means providing for passage of cleaning fluid through the strainer disks in reverse flow to remove materials lodged on the inlet faces of the disks including collecting and discharging means for said materials mounted in the casing at the inlet faces of the disks.

DANIEL RAYMOND McNEAL.