March 24, 1959 S. T. TRANSEAU 2,879,094

PERIPHERAL SEAL ASSEMBLY

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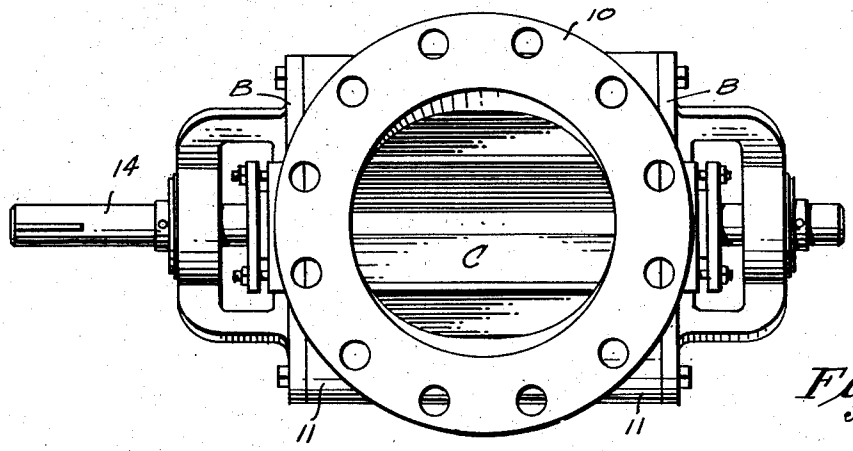


Fig. 1.

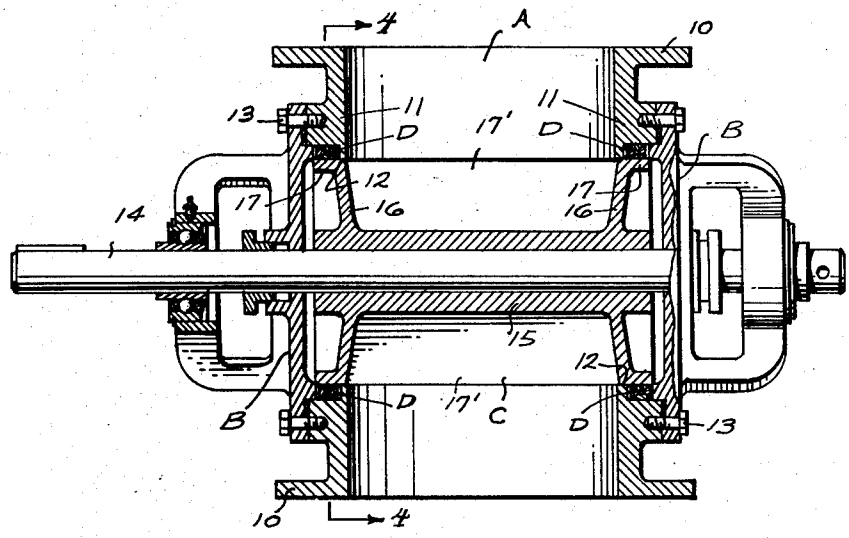


Fig. 2.

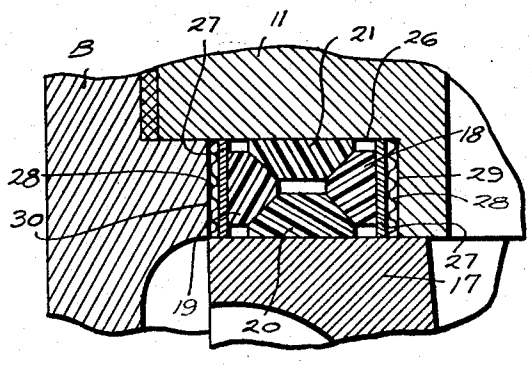


Fig. 3.

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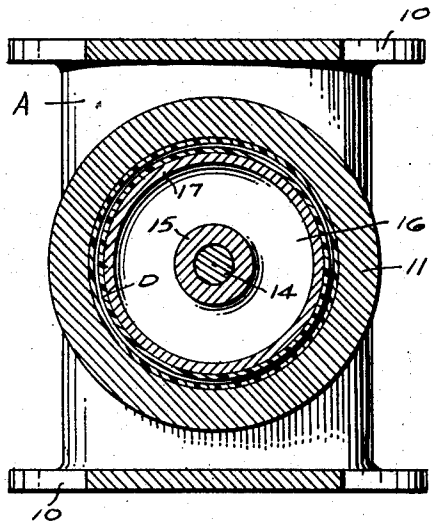


Fig. 4.

Fig. 5.

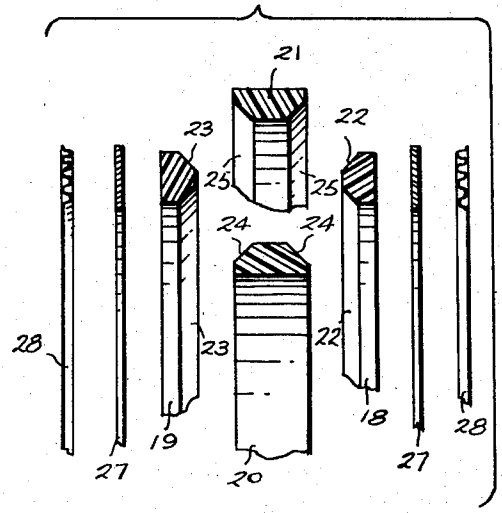
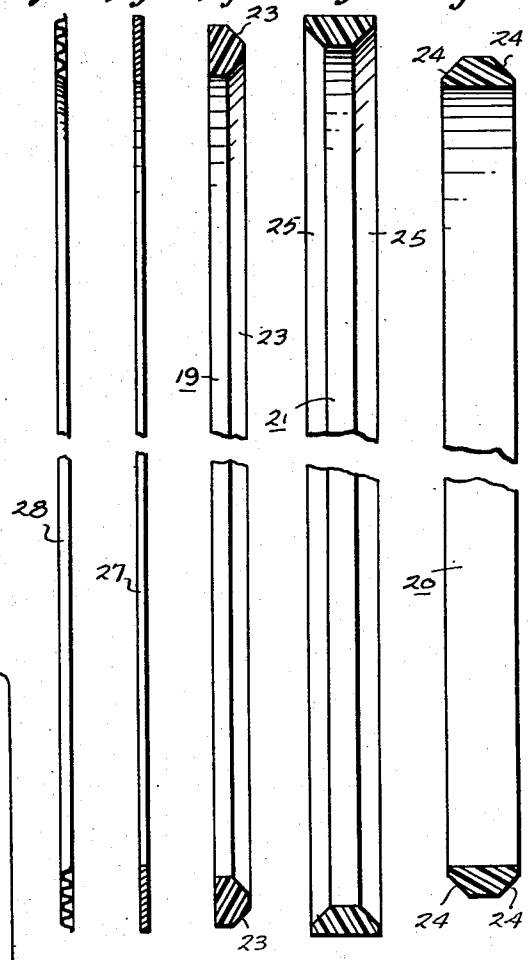


Fig. 6. Fig. 7. Fig. 8. Fig. 9. Fig. 10.



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PERIPHERAL SEAL ASSEMBLY

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Application January 2, 1957, Serial No. 632,062

5 Claims. (Cl. 288—7)

This invention relates generally to means for sealing a wall opening that has a revoluble member extending therethrough, and more particularly to an improved peripheral seal intervening the rotor and rotor mounting body of a rotary feeder.

A principal object of the present invention is to provide such a seal which operates to effectively retain internal pressures and all material handled by the rotary feeder.

Another principal object of the present invention is to provide such a seal which may be run dry or lubricated.

Still another object of the present invention is to provide such a seal which facilitates disassembly of the feeder for frequent cleaning and which is easily reassembled.

A further object of the present invention is to provide such a peripheral seal with spring loaded axially floating sealing rings that automatically operate to take up wear.

Another further object of the present invention is to provide such axially floating sealing rings wedged firmly between intervening sealing rings by said spring load.

Still further objects and advantages of the present invention will appear more fully hereinafter, it being understood that the invention consists substantially in the combination, construction, location and relative arrangement of parts, all as described in detail hereinafter, as shown in the accompanying drawings and as finally pointed out in the appended claims.

In the accompanying drawings:

Figure 1 is a plan view of a rotary feeder constructed in accordance with and embodying the principles of the present invention.

Figure 2 is a longitudinal section through the feeder shown in Figure 1.

Figure 3 is an enlarged fragmentary transverse section taken through the peripheral seal.

Figure 4 is a vertical section taken on line 4—4 of Figure 2.

Figure 5 is a fragmentary exploded diametric section through the peripheral seal.

Figure 6 is an enlarged diametric section through a corrugated spring member of the peripheral seal.

Figure 7 is an enlarged diametric section through a plate member of the peripheral seal.

Figures 8, 9 and 10 are enlarged diametric sections through sealing rings of the peripheral seal.

The rotary feeder constructed in accordance with and embodying the principles of the present invention includes a hollow cylindrical body member A, a pair of end plate members B—B that are disposed respectively on diametrically opposite sides of the body A, a rotor member C intervening the end plates B—B, and a pair of peripheral seals D—D extending about the rotor C respectively close adjacent the end plates B—B.

The body A is an elongated member provided externally at opposite ends thereof with a pair of annular bolting flanges 10—10. Diametrically opposite wall areas 11—11 of the body A are apertured, as at 12—12, and removably secured respectively to these wall areas, as by bolts 13, are the end plates or closure members B—B.

Suitably journalled in the end plates B—B is a shaft 14, which shaft has fitted thereon the rotor C. The latter has a central hub 15, a pair of axially spaced radially extending webs 16—16 that peripherally terminate in axially extending rims 17—17, and radially extending circumferentially spaced vanes 17' that intervene the webs 16—16.

The rims 17—17 are closely revolubly fitted respectively into the apertured wall areas 11—11, and extending about these rims 17—17 are annular spaces or channels that respectively receive the peripheral seals D—D, now to be described.

Each peripheral seal includes a pair of axially spaced sealing rings 18 and 19 and a second pair of sealing rings 20 and 21, the latter pair being disposed one within the other between the axially spaced sealing rings 18 and 19. The opposed faces of the sealing rings 18 and 19 are each provided with a pair of circumferentially extending surface areas that taper axially in opposite directions, the tapering surface areas of the sealing ring 18 being designated 22—22 and the tapering surface areas of the sealing ring 19 being designated 23—23. The opposed faces of the sealing rings 20 and 21 are each provided with a pair of circumferentially extending surface areas that taper axially in opposite directions, the tapering surface areas of the sealing ring 20 being designated 24—24 and the tapering surface areas of the sealing ring 21 being designated 25—25. The angles of taper of the several surface areas aforesaid are complimentary, in consequence of which, in the assembled condition of the sealing rings, opposed tapering surface areas are fully engaged, as shown.

The sealing ring 20 is fitted upon and may be fixed to the rim 17, while the sealing ring 21 is fitted into and may be fixed to an axially extending surface area 26 of a recess that is formed in the wall area 11 and which extends about the rim 17. Loosely fitted over the rim 17 are a pair of axially spaced annular plate members 27—27 that are disposed respectively on opposite sides of the assembly of sealing rings, and also loosely fitted over the rim 17 are a pair of annular plate members 28—28 that are made of spring metal and which are provided with a series of circumferentially extending corrugations. One spring member 28 is disposed between the inner annular plate member 27 and a radially extending surface area 29 of the recess aforesaid, while the other spring member 28 is disposed between the outer annular plate member 27 and a radially extending inner surface area 30 of the end plate B.

The sealing rings 18, 19, 20 and 21 preferably are made of the same material, which material has a low coefficient of friction, such as Teflon, a product of E. I. du Pont de Nemours & Co., Wilmington, Delaware. However, neoprene, asbestos, rawhide and even other materials may be found satisfactory, depending upon the operating conditions to be met. If desired, the annular peripheral seal accommodating channel may be packed with a lubricant.

Obviously, the rotary feeder is adapted to be bolted into a conduit for fine or course material. The rate of material flow is controlled by rotation of the rotor C, and leakage of the material and or pressure through the rotor accommodating openings 12—12 that are formed in the feeder body A are effectively prevented by the peripheral seals D—D.

The spring members 28—28 of a peripheral seal D act through the annular plate members 27—27 to bias the axially spaced sealing rings 18 and 19 axially toward one another, in consequence of which these sealing rings 18 and 19 are firmly wedged between the intervening sealing rings 20 and 21, the tapering surface areas 22—22

of the sealing ring **18** and **23**—**23** of the sealing ring **19** being pressed thereby into firm, sealing engagement respectively with the complementally tapering surface areas **24**—**24** of the sealing ring **20** and **25**—**25** of the sealing ring **21**. The wedging action circumferentially compresses and thereby radially contracts the sealing ring **20** into firm, sealing engagement with the rim **17**, and simultaneously circumferentially tensions and thereby radially expands the sealing ring **21** into firm, sealing engagement with the opposed surface area **26**.

As the sealing rings wear, the axially spaced sealing rings **18** and **19** automatically shift axially or float toward one another under the influence of the spring members **28**—**28** and thereby take up the wear. Normally, the sealing ring **21** will remain stationary with the feeder body A, while the sealing ring **20** will revolve with the rotor rim **17**. The sealing rings **18** and **19** are free to stay stationary with the sealing ring **21** or to turn with the sealing ring **20**, as conditions warrant.

It should be noted that although, as illustrated, each peripheral seal has four sealing rings, if desired, more can be utilized—ten sealing rings can be effectively utilized, for example. In this ten ring assembly, four of the sealing rings are axially spaced and a pair of sealing rings that are disposed one within the other intervene each successive pair of axially spaced sealing rings. Whenever more than four sealing rings are utilized, all of them must be free to float axially.

It will be understood, of course, that the present invention as hereinbefore described and as shown in the accompanying drawings is susceptible of various changes and modifications which may be made from time to time without departing from the general principles or real spirit of the invention, and accordingly it is intended to claim the same broadly, as well as specifically, as indicated by the appended claims.

What is claimed as new and useful is:

1. Sealing means for use between a pair of relatively rotatable members, a first one of said members having a circular outer wall area and being fitted within the second and adapted for rotation therein about the circular axis of said outer wall area, the second of said members having an inner annular wall area concentric with the rotational axis of said first member positioned in facing relationship to the circular wall area of said first member and thereby defining an annular space therebetween, said sealing means being adapted to effect a seal between and along the aforesaid facing wall areas of said relatively rotatable members and comprising a first and second pair of sealing rings, each ring having a cross-sectional area in the shape of a trapezoid whose longer base also forms one side of a rectangle with no part of the rectangular and trapezoidal areas being co-extensive, said first pair of sealing rings extending circularly through the annular space between said pair of relatively rotatable members for non-engaging relationship with said members or each other and being disposed in axially spaced relationship relative to the rotation axis of said first member with their smaller trapezoidal bases in facing relation, said second pair of sealing rings extending non-engagingly and

radially concentrically through the annular space between said pair of relatively rotatable members with their smaller trapezoidal bases in facing relation, the larger radiused ring of said second pair being adapted for circumferential engagement with the inner annular wall area of said second member and the smaller radiused ring of said second pair being adapted for circumferential engagement with the circular outer wall area of said first member, the trapezoidal side areas of said first pair of sealing rings being adapted for slidably circumferentially engaging the trapezoidal side areas of said second pair of sealing rings, and means for biasing said first pair of sealing rings toward each other to thereby firmly seat the trapezoidal sides of the sealing rings against one another, said larger radiused ring of said second pair being thereby radially expanded for a tight fit against the inner annular wall area of said second member and said smaller radiused ring being thereby radially compressed for a tight fit against the circular outer wall area of said first member.

2. The sealing means according to claim 1 wherein said biasing means includes a pair of annular discs with one radial surface of each disc adapted to engage one of the non-facing radial surfaces of said first pair of sealing rings, and spring means adapted for engagement with the other radial surface of each of said annular discs and adapted to exert pressure thereagainst.

3. The sealing means according to claim 1 wherein the trapezoidal portion of the cross-sectional area of each sealing ring is in the shape of an equilateral trapezoid, and the trapezoidal sides of adjacent sealing rings are so sloped that the trapezoidal bases make right angles with each other.

4. The sealing means according to claim 3 wherein the shorter trapezoidal base of each of said second pair of sealing rings is dimensionally greater than the shorter trapezoidal base of each of said first pair of sealing rings, whereby the seal may be maintained regardless of frictional wear on the trapezoidal side surfaces by allowing the first pair of sealing rings to move toward each other under the influence of said biasing means.

5. The sealing means according to claim 4 wherein said sealing rings are made of the same anti-friction material, whereby frictional wear on the trapezoidal side surfaces causes the sealing rings to wear symmetrically and prevents physical distortions which tend to render the seal less effective.

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