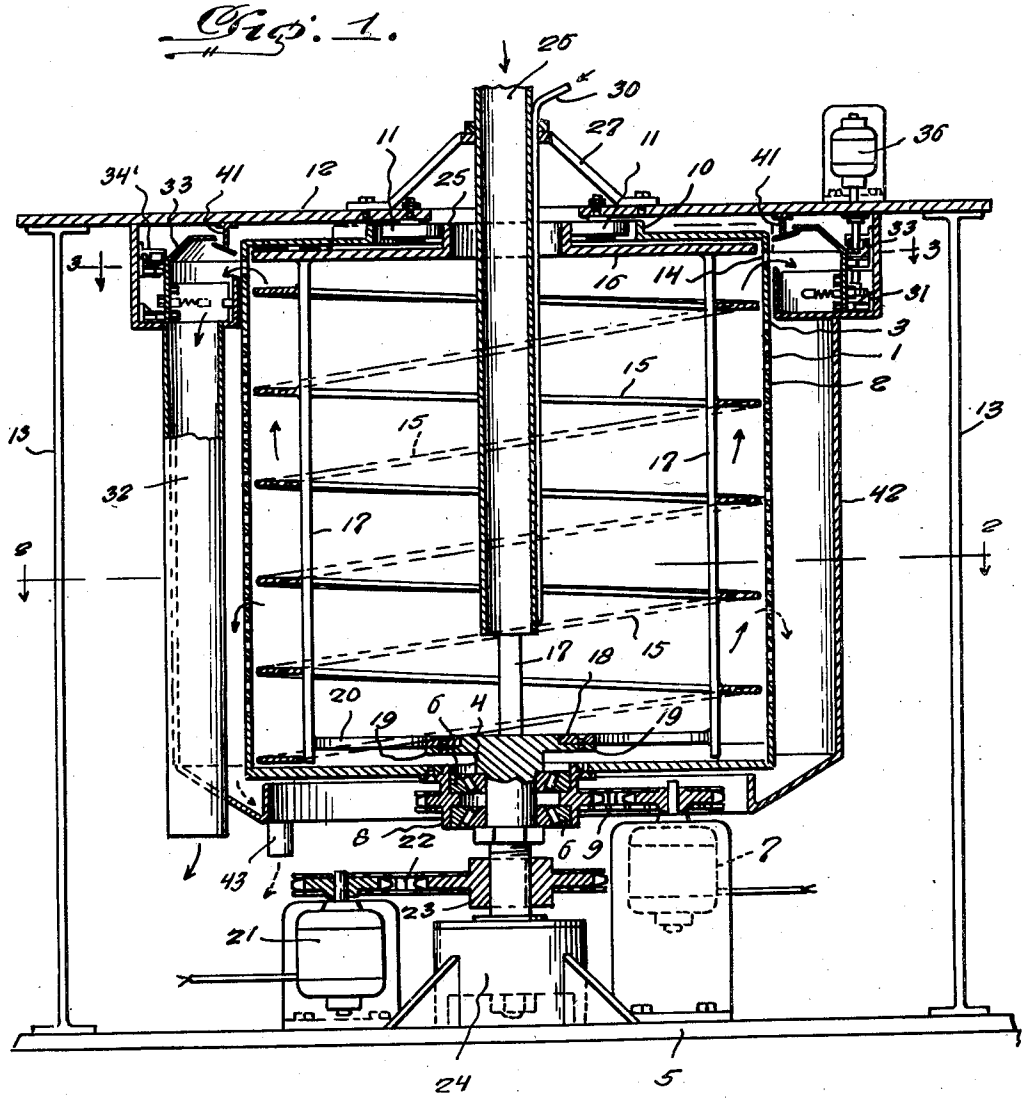
March 7, 1950 J. Q. BUQUOI ET AL 2,499,457

CONTINUOUS CENTRIFUGAL DRIER

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Fig. 1.



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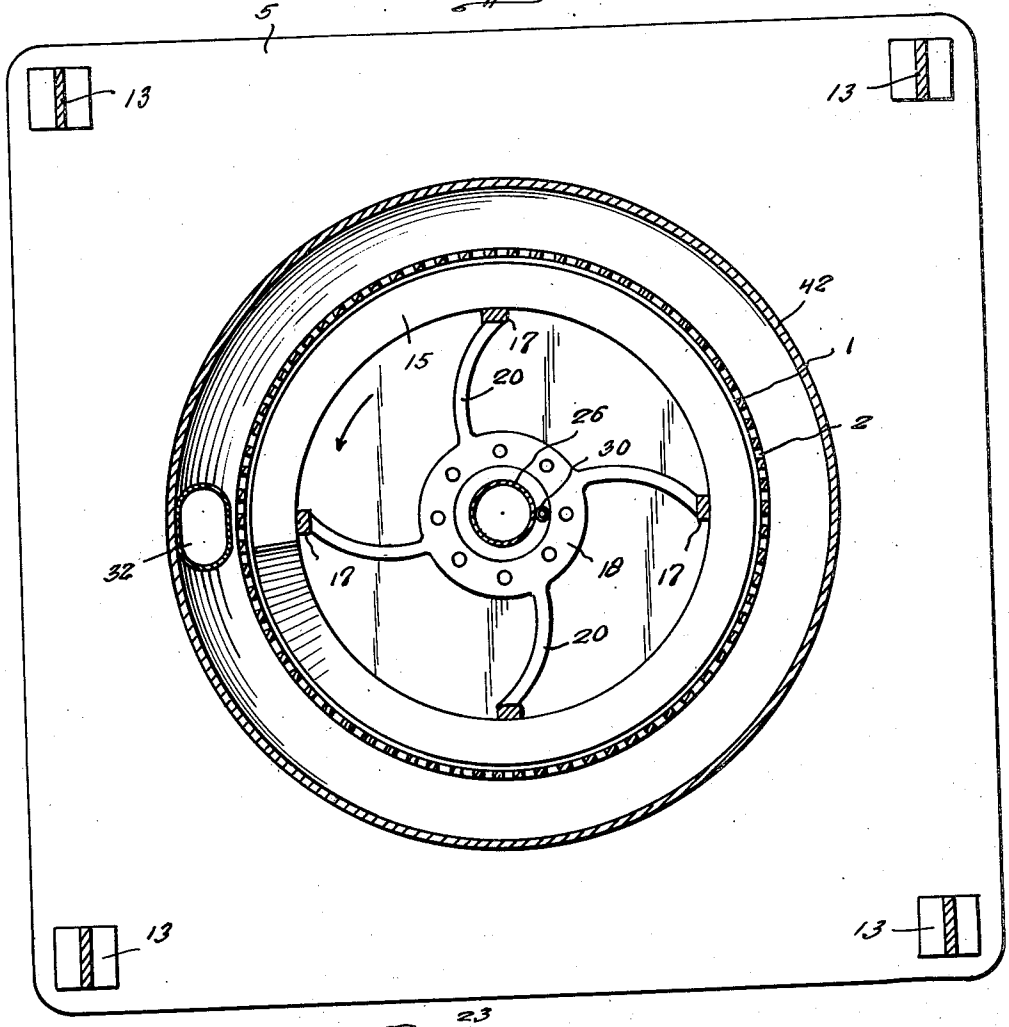
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CONTINUOUS CENTRIFUGAL DRIER

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Fig. 2.



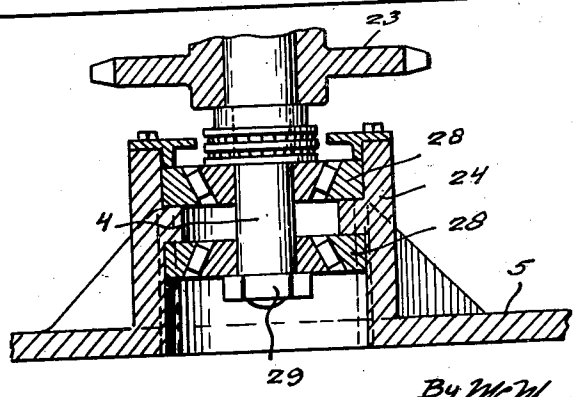


Fig. 3.

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CONTINUOUS CENTRIFUGAL DRIER

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Fig. 3.

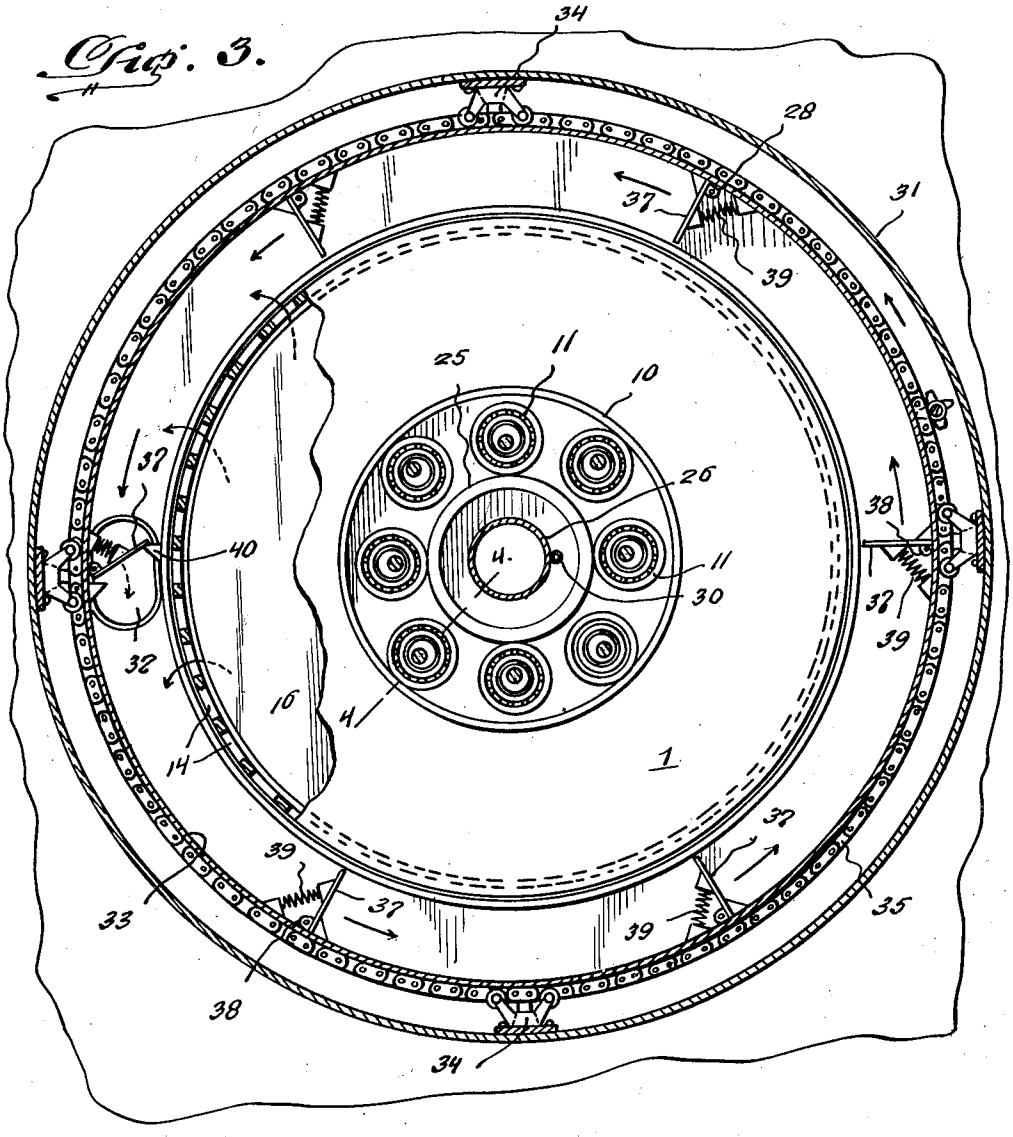
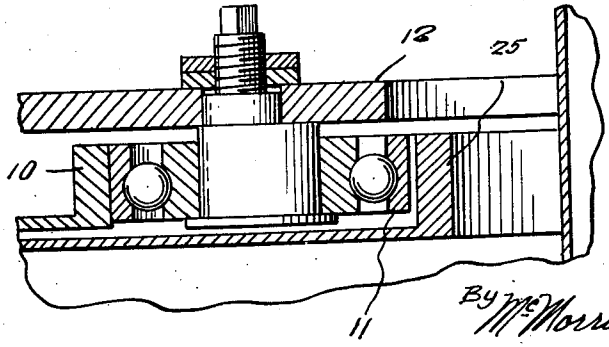


Fig. 4.



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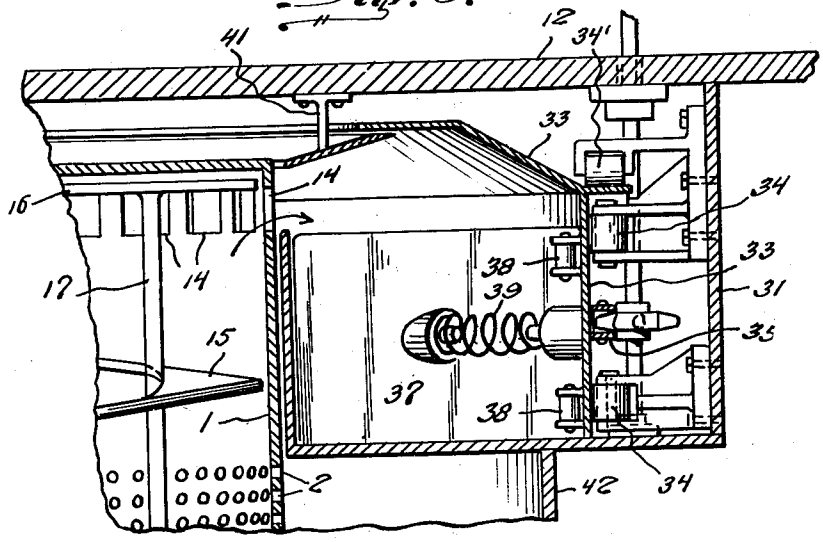
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CONTINUOUS CENTRIFUGAL DRIER

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Fig. 5.



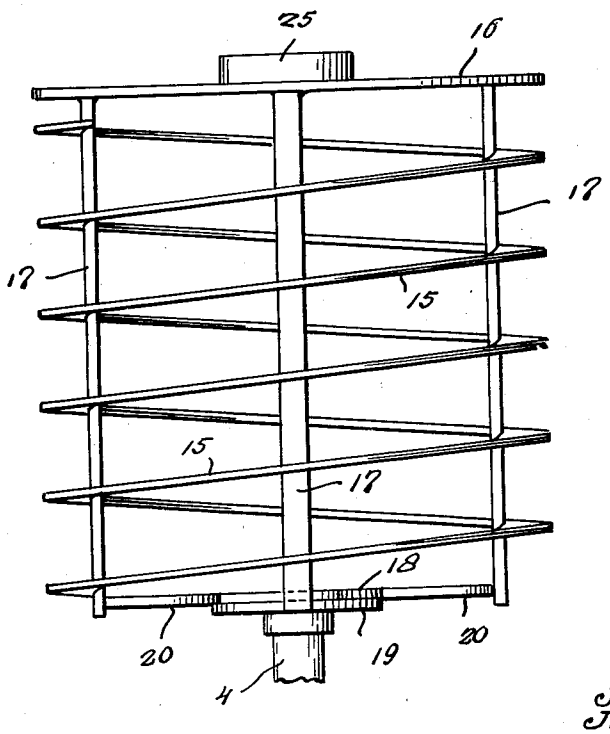


Fig. 6.

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2,499,457

UNITED STATES PATENT OFFICE

2,499,457

CONTINUOUS CENTRIFUGAL DRIER

John Q. Buquoi, Jules J. Noel, Jr., and Earl J. Schexnaildre, Plaquemine, La.

Application December 24, 1946, Serial No. 718,202

1 Claim. (Cl. 210—69)

1

This invention relates to a continuous feed and discharge centrifugal machine, of the rotating basket-type and which is provided with an interior helix which conveys the dried material upward from the basket to a discharging conveyor. The rotating basket is perforated or otherwise constructed to convey away or permit the discharge of liquid separated by centrifugal action from the material being dried.

Prior methods of centrifugal drying were performed by a batch-wise operation, that is, the basket was loaded, dried by centrifugal spinning, and discharged, this cycle being continuously repeated in the drying of a given amount of slurry. The unloading or discharging of the basket was done manually by a plow or scraper, by cutting the dried material from the basket and usually dropping the material into a receiver or bin on a floor level below that of the drying machine.

The old centrifugal machines are generally motor-driven from an overhead position. This overhead motor is supported by a frame built around the machine, thus limiting and obstructing the area of operation. This design also generally presents a machine which operates on a suspended shaft from the motor which requires that the basket of the machine must at all times be loaded evenly in order to prevent oscillation caused by unbalanced loads, all of which consumes considerable time in loading as well as discharging an even amount of material, if dried material is to be left in the basket to aid in drying a subsequent batch.

The object of our invention is to provide a continuous centrifugal drying machine wherein the feed to the machine can be fed continuously and the dry material likewise continuously discharged, by providing a variable differential drive between a centrifugal basket and a helical means of discharging dried material, and provide in conjunction with this device a conveyor for the purpose of conveying the dried material to a predetermined location.

It is another object of the invention to provide a centrifugal drier with the drive mechanism working from the bottom and so mounting and journaling the machine as to compensate for oscillation or vibration caused by unbalanced or uneven loading of the machine.

Other objects and advantages of the invention will be apparent from the following detailed description and claim taken in conjunction with the annexed drawings, where like parts are indicated by like reference characters and wherein:

2

Figure 1 is a vertical longitudinal section showing the centrifugal machine.

Figure 2 is a cross sectional top view taken through the plane 2—2 of Figure 1.

Figure 3 is a cross sectional top view taken through the plane 3—3 of Figure 1.

Figure 4 is a vertical section of the top bearing arrangement taken through plane 4—4 of Figure 3.

Figure 5 is a fragmentary vertical section of the conveyor mechanism.

Figure 6 is a side elevation of interior helical mechanism.

Figure 7 is a vertical section of the bottom bearing assembly showing the tapered bearings and bearing housing.

Referring to the drawings and more specifically to Figure 1, reference character 1 represents a rotating basket which is provided with perforations 2 in the shell of the said basket, said perforations or holes running to a short distance from the top of the basket terminating at a point approximately at 3. The basket 1 may be provided with several layers of different mesh screen mounted in any preferred conventional manner instead of having the perforated shell described above. The basket 1 rotates on a centrally placed downwardly extending rotating shaft 4, which is journaled by radial and thrust bearings, adjustable by lock nuts, said bearings being fitted or contained in a suitable housing 24 which is permanently located or engaged on a rigid foundation 5. Said basket 1 is mounted rotatably on the shaft 4 by means of bearings 6 and is rotated by means of an electric motor 7 which engages the basket bearing housing 8 by means of a sprocket chain 9 which allows the basket to rotate independently of an interior basket helix hereinafter described. The basket top is provided with a race 10 which rotates on top bearings 11, which are supported by a top support plate 12 and which is the top of a general machine housing and is supported by the "I" beams 13. Around the top of the basket shell or wall are provided discharge ports 14 through which dried material is discharged from the interior rotating helix.

Provided and arranged inside the basket is a helix flight arrangement 15 which is rigidly mounted on and rotates with the main shaft 4 but independently of the basket. Said helix mechanism is composed of a top plate 16, downwardly extending bars or rods 17 from the top plate around which the spiral helix or scroll is formed, and an annular bottom piece 18 by which the helix is

bolted to the shaft flange 19. From said piece 18, which is of a size only large enough to accommodate the shaft connecting flange, are provided radial spokes 20 which are so formed as to be convex as to the direction of rotation and designed in this manner so as to relieve the stress on the said spokes due to rotation, and extend to and are connected with the downward extending rods or bars 17.

The main shaft 4 extends downward through the basket bottom bearings 6 and through the supporting bearings 28, the housing of which is indicated at 24. On the main shaft 4 between the bottom bearings 28 and the basket bearings 6, a sprocket and chain driving mechanism is provided in order to rotate said main shaft, said chain and sprocket being indicated by the reference characters 22 and 23 respectively, and connected to a source of power, preferably an electric motor herein indicated by 21. This arrangement provides a means for rotating the interior helix or scroll independently and at a speed equal to or varying from the speed of rotation of the basket. The helix top plate 16 is flanged up to form a race and so arranged to be guided by the top bearing rollers 11, said flanged up portion being indicated by 25.

The helix or scroll rotates within the basket independently and thus provides a means by which said helical flights move the dried material from the bottom and from the walls of the basket upward onto the conveyor hereinafter described, for transportation to the discharge pipe. The electric motors 7 and 21 are of the variable speed type and by means of tachometers the desired speeds of the basket and helix can be easily obtained. Speeds of said motors can be varied by means of variable speed controls.

Material to be dried by the machine is fed into the machine through an intake or feed pipe 26 from the top of the machine. Said feed pipe 26 extends downward into the machine basket axially thereof and allows the material to be dried to fall on the bottom of the basket from where it is forced by centrifugal force against the basket walls, the water or mother liquor of any sort passing through the basket wall perforations and the solid material remaining in the basket. The scroll picks up the dried material and carries it upward to the top of the basket where it falls onto the conveyor. The aforementioned feed pipe is held stationary and rigid by means of braces 27 which are secured to the top support plate 12.

The top bearings keep the basket and scroll centered and are mounted on the top support plate 12 in such a manner that each bearing is radially offset relative to adjacent bearings on either side so that a radially inwardly offset set of bearings engage the scroll race and remaining alternate bearings engage the basket race as indicated in Figure 3. A sectional view of said top bearings is shown in Figure 4.

The main bottom bearings 28 in the housing heretofore indicated by 24 in Figure 1 are shown in section in Figure 7 and are of the radial and thrust type and adjustable by a lock nut 29 on the shaft 4.

A water line 30 is provided and is rigidly mounted parallel to the feed pipe and is indicated in Figure 1. Said line is provided for washing the material if deemed necessary.

Attached to and extending downward from the top support plate 12 is an annular flange 31 which forms a trough, one side of which is so cut as not

to extend above the basket discharge ports 14. This trough receives the dried material which is conveyed from the basket by the helix. Inside said trough is provided a means of conveying the dried material discharged to a common discharging pipe 32, and which comprises an independently operated circular frame 33 which is supported by a circumferential series of anti-friction means comprising a plurality of assemblies of three rollers or guide structures shown at 34, 34 and 34' two contacting the side of the said frame and one engaging it from the top. Said roller or guide assemblies are located at four points around the inside of the machine housing or casing as indicated in Figure 3. Said guides are permanently attached to the machine housing by any suitable means. The independently operated frame 33 is actuated by a chain drive mechanism 35 and a motor 36 mounted on the top support plate 12. The circular frame 33 thus rotates in the trough formed by the annular flange 31 and serves as a means of scraping the discharged material in the trough to the opening of discharge pipe 32. This scraping is accomplished by means of scraping plates 37 which are attached to the rotating frame 33 by means of hinges 38 and springs 39 which maintain the said scraping plates in an extended or scraping position. As the scraping plates 37 are rotated on the frame 33 they approach the discharge pipe opening 32 where said plates contact a stop lug 40 which forces the plate backward on the hinge and against the spring tension, and as the frame 33 rotates the scraping plate is snapped back into its extending or scraping position. Such action aids the discharge of material into the discharge pipe and prevents plugging and bridging of solid material in the conveyor trough.

Depending from the top support plate 12 is an annular flanged piece 41 which acts primarily as a means of covering the conveyor trough and prevents material from being pushed out of the trough onto the top of the rotating basket. Said piece is overlapped by the arched top of the rotating frame 33.

Dried material from the centrifugal machine is discharged through the discharge pipe into any suitable type of container and either stored or transported to any desired location.

An outer basket shell or housing 42 is provided which encloses the basket and contains a mother liquor discharge pipe 43 at any conveniently located point on the bottom of said shell. The space between the basket and the shell acts as a receiving space for liquid passing from the basket due to centrifugal force. This annular space between the basket and the shell may be provided with a partition or be partitioned in such a way as to enable the collection of the mother liquors of varying densities and separate the same if liquids are of sufficient varying densities to effect a separation, separate drains being provided in each partition.

It is to be understood that alterations and modified arrangement of parts may be accomplished without departing from the spirit of the invention, therefore we do not restrict ourselves to the examples herein specified or the arrangement of parts shown by the annexed drawings.

What is claimed is:

In a continuous centrifugal separator of the type including a helical conveyor, a foraminous basket concentrically disposed about said conveyor, and wherein said basket and conveyor are adapted to be relatively rotated on a common ver-

tical axis to move material on said conveyor axially of said basket, the improvement comprising a separate motor for rotating each of said basket and conveyor, means for varying the speed of each motor, means journaling said basket and conveyor together for individual rotation relative to each other, a stationary frame overlying said conveyor and basket, said conveyor and basket each including upwardly-directed cylindrical flanges concentrically of said axis, said flanges being radially spaced, an annular series of separate bearings depending from said frame between said flanges, alternate bearings being outwardly offset and engaging said flange of said basket while the remaining bearings engage said flange of said conveyor.

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