

Oct. 20, 1931.

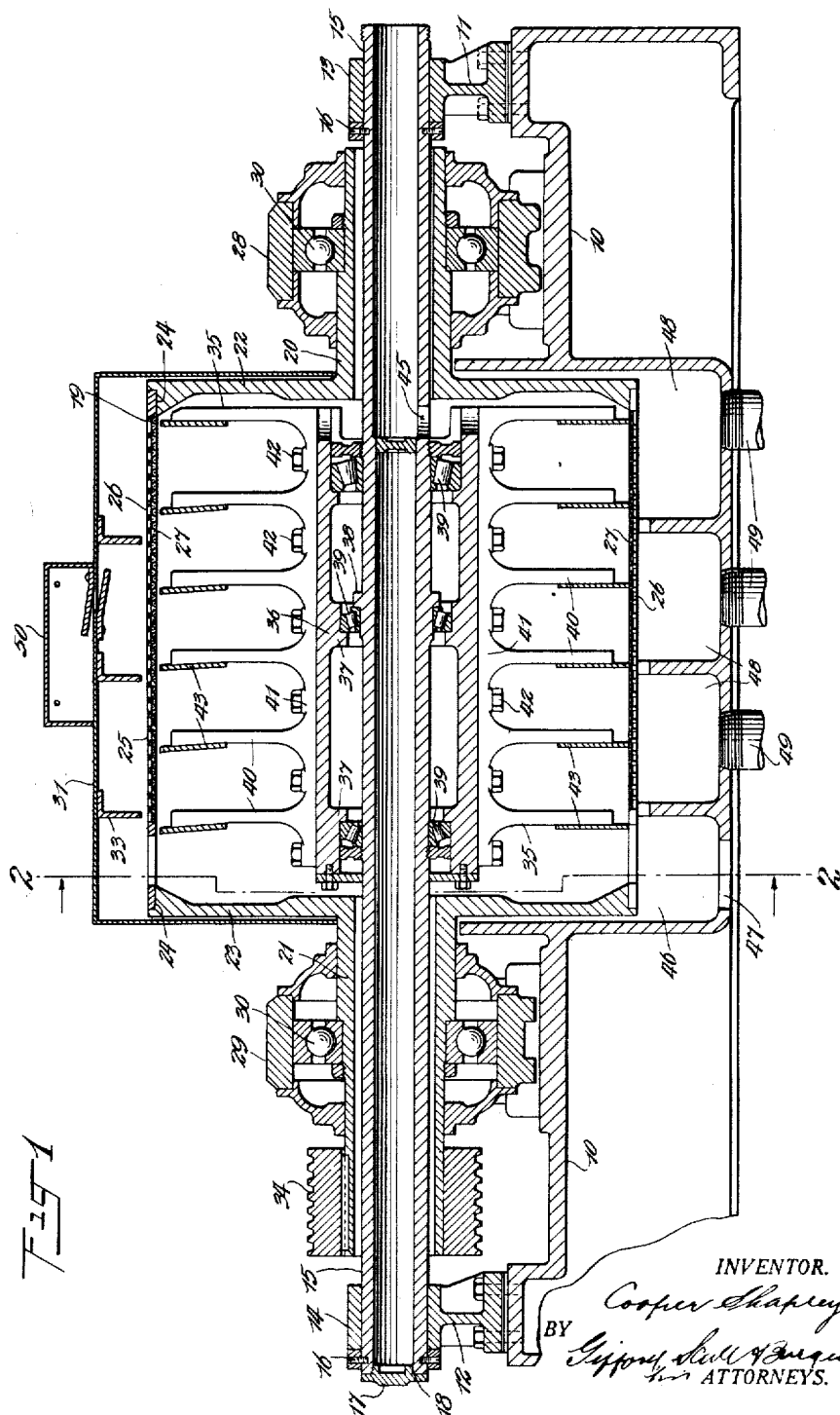
C. SHAPLEY

1,828,548

CENTRIFUGAL MACHINE

Filed Aug. 3, 1929

4 Sheets-Sheet 1



INVENTOR.

BY *Cooper Shapley*
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Oct. 20, 1931.

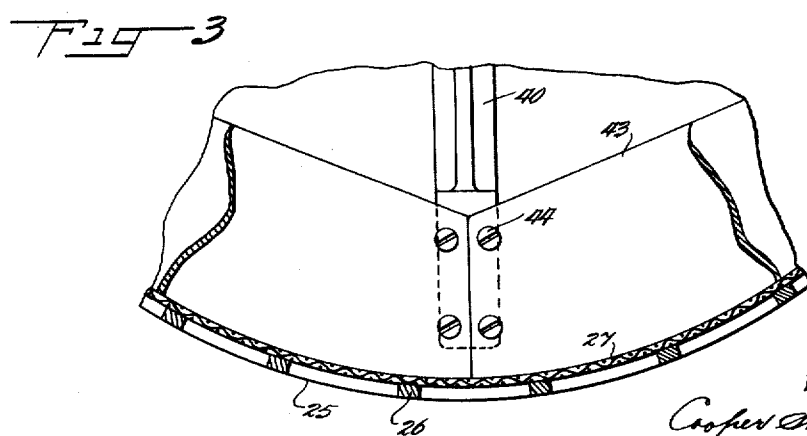
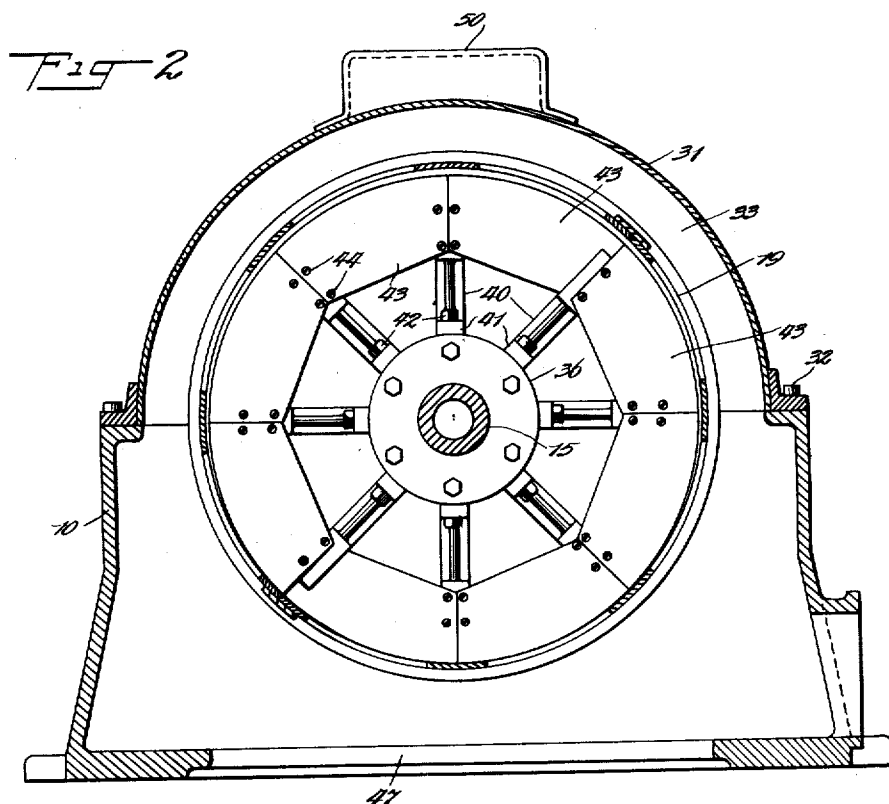
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CENTRIFUGAL MACHINE

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4 Sheets-Sheet 2



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Oct. 20, 1931.

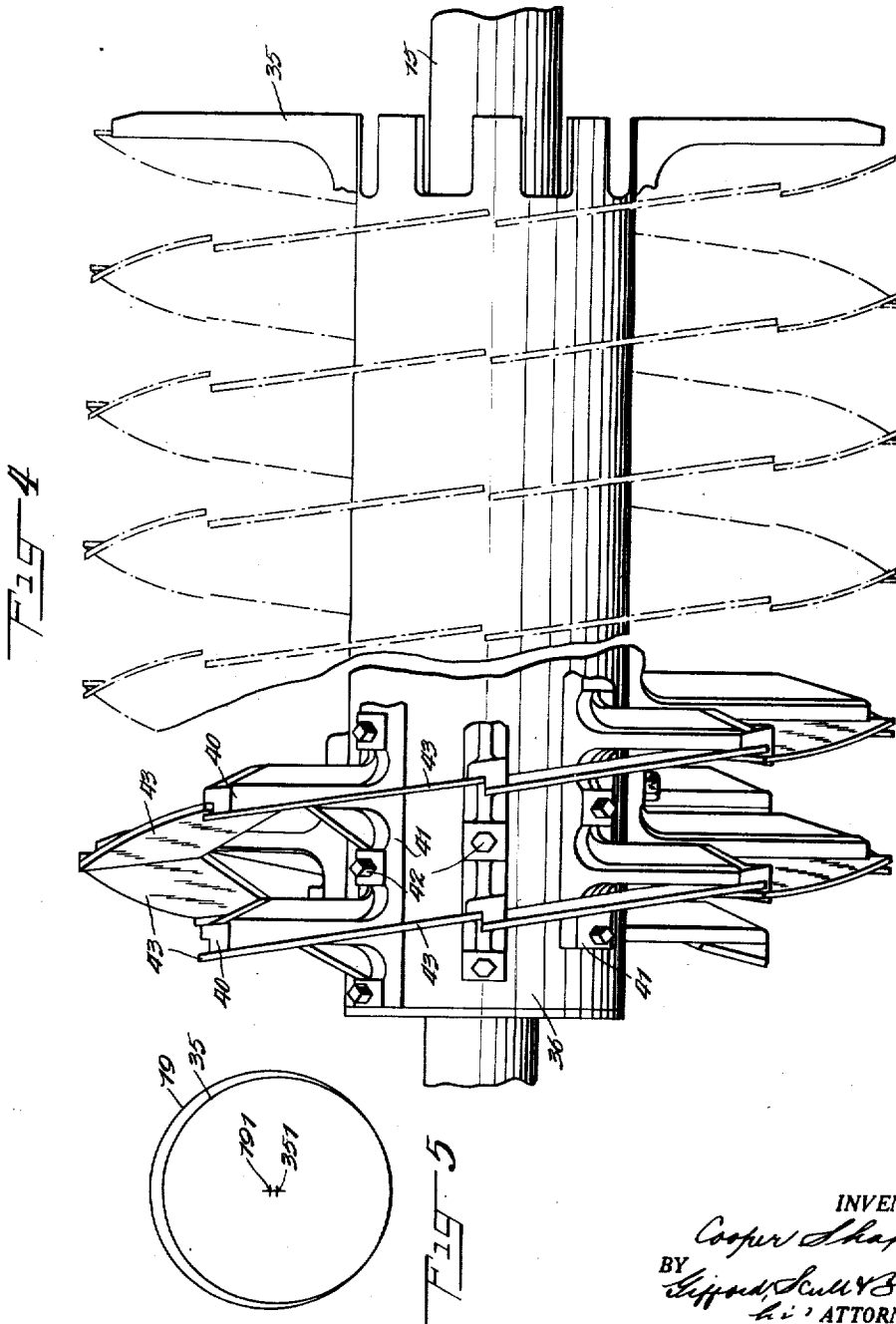
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CENTRIFUGAL MACHINE

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4 Sheets-Sheet 3



INVENTOR.
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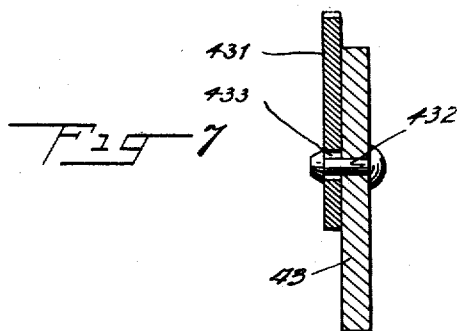
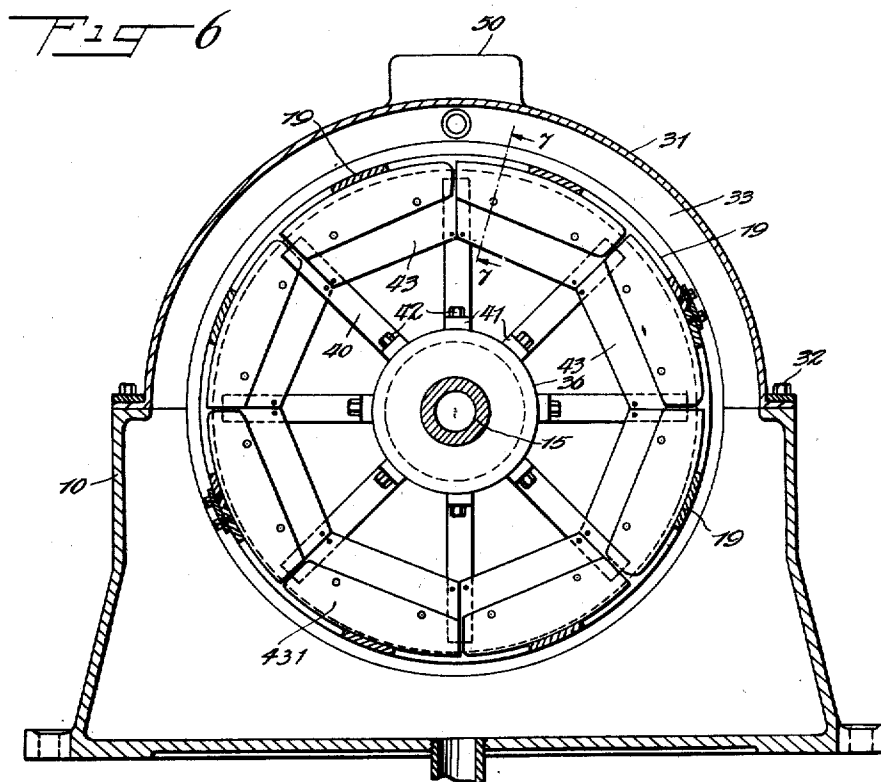
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CENTRIFUGAL MACHINE

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4 Sheets-Sheet 4



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UNITED STATES PATENT OFFICE

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CENTRIFUGAL MACHINE

Continuation of application Serial No. 282,459, filed June 2, 1928. This application filed August 2, 1929. Serial No. 383,309.

My invention more particularly relates to a centrifugal machine for separating solids from liquids, and in which the solids are utilized for driving one of the members from the other.

Centrifugal machines for separating solids from liquids have hitherto been made comprising an inner and an outer rotary member, the inner member being provided with a worm. As it is desirable to carry the solid material along longitudinally of the machine as it is separated from the liquid, the inner and outer rotary members have been driven at slightly different speeds, which required a differential mechanism which is quite expensive.

In accordance with my invention, the inner and outer rotary members are mounted eccentrically with respect to each other, thereby providing means for driving one rotary member from the other through the agency of the solid material, and it therefore dispenses with the usual differential mechanism.

My present application is a continuation of my application Serial No. 282,459, which was filed in the Patent Office on or about June 2, 1928.

My invention will best be understood by reference to the accompanying drawings, in which I have illustrated a preferred embodiment, and in which Fig. 1 is a longitudinal section taken through the machine; Fig. 2 is a section taken on the line 2—2 of Fig. 1; Fig. 3 is a fragmentary detail view illustrating a portion of the inner end of the outer rotary members on a larger scale; Fig. 4 is a plan view of the inner rotary member, the right-hand portion thereof being shown more or less diagrammatically; Fig. 5 is a diagrammatic view illustrating in an exaggerated way the eccentric relation of the inner and outer rotary members; Fig. 6 is a sectional view similar to Fig. 2 but illustrating a modification, and Fig. 7 is a sectional view taken on the line 7—7 of Fig. 6.

Like reference characters indicate like parts throughout the drawings.

Referring now to the drawings, 10 is the

frame of the machine on which are mounted standards 11 and 12 provided with hollow members 13 and 14, respectively, in which is received a stationary cylindrical member 15 which is preferably hollow and which is preferably prevented from rotating by set screws 16. The left-hand end of the member 15, as viewed in Fig. 1, is preferably closed by a cap 17, which may be provided with screw threads as at 18, engaging corresponding screw threads on the inner portion of the member 15.

Surrounding the member 15, is an outer rotary member indicated generally at 19, comprising sleeves 20 and 21 surrounding the shaft 15 and spaced therefrom. Plates or discs 22 and 23, preferably circular in form, at the inner ends thereof are preferably formed integral with the sleeves 20 and 21, and are formed on their peripheries with recesses 24, in which are received the ends of a screen member indicated generally at 25. The screen member 25 comprises generally a foraminous member 26 on the inner side of which is secured a finer metallic screen member 27. The details of the screen may be the same as that illustrated in an application of William C. Laughlin, Serial No. 273,670, which was filed in the United States Patent Office on or about April 28, 1928, and as the details of this screen member constitute no part of my present invention, in order to avoid confusion, they have not been illustrated in detail.

The sleeves 20 and 21 are mounted in pillow blocks 28 and 29, suitable ball bearings 30 preferably being interposed between each of the sleeves and its pillow block. The upper portion of the centrifugal machine is enclosed by a removable casing portion 31, which is secured to the frame 10 as by bolts 32. The upper portion of the casing is preferably provided with a series of peripherally extending angle irons 33 for the purpose of strengthening the casing. The outer rotary member, in the embodiment illustrated, is driven by a suitable driving member 34, illustrated as a pulley.

An inner rotary member, indicated gen-

erally at 35, is, in the embodiment illustrated, mounted for rotation on the shaft 15. The inner rotary member comprises a cylindrical member 36, preferably provided with inner annular ribs 37 which, with corresponding ribs 38 mounted on the inner shaft 15, form cages for roller bearings 39. A worm conveyor is secured to the cylindrical member 36, and preferably comprises a plurality of radially extending spokes 40, which are preferably arranged in rows longitudinally of the machine, and are also preferably formed integrally with base portions 41 which extend longitudinally of the cylindrical member 36, and are secured thereto as by bolts 42. Plates 43 are secured to the outer ends of the spokes 40, as by screws 44, forming a helical worm which moves the solid material longitudinally of the machine.

The inner and outer rotary members 35 and 19, respectively, are mounted eccentrically with respect to each other, so that the axis 351 of the inner rotary member is offset from the axis 191 of the outer rotary member, and is preferably located below the same as best shown in Fig. 5. The mixture of the solid and liquid material is introduced to the centrifugal machine through the right-hand end of the hollow member 15 through a connection not illustrated, suitable openings 45 being provided in the said member to permit the material to pass to the screw conveyor.

The operation of the centrifugal machine embodying my invention will readily be understood from the foregoing description, and is as follows:

The material is introduced to the machine through the right-hand end of the hollow shaft 15 as previously indicated, passes through the openings 45, is received between the blades of the screw conveyor and is thrown outwardly by centrifugal action. The liquid passes through the screen, and the solid material is deposited against the screen member 27. The outer rotary member is driven by the member 34 and, of course, rotates the solid material which is received against the screen, and the solid material is utilized to rotate the inner rotary member from the outer rotary member.

The solid material which is thrown outwardly against the screen member 27, is forcibly rotated, therefore, by the outer rotary member, and the engagement of this solid material with the blades of the inner rotary member serves to rotate the inner rotary member, and since the two members are arranged eccentrically with reference to each other, the inner member is rotated at a slightly higher rate of speed than the outer rotary member, as will be evident from Fig. 5.

The blades of the inner rotary member are preferably so arranged that they just

engage the screen member of the outer rotary member. It will be evident that since the two members are eccentric with reference to each other, the radius of the inner rotary member is necessarily less than that of the outer rotary member. When the solid material, which is being carried by the outer rotary member, therefore, engages the inner rotary member, it moves the latter, and moves it at a slightly higher rate of speed than the outer rotary member, so that the conveyor, which forms a part of the inner rotary member, carries the solid material along longitudinally of the machine. It will, of course, be understood that as the mixture of liquid and solids is carried along, the liquid is successively passed through the screen member, the solid material thereby becoming drier as it moves longitudinally of the machine until it reaches a chamber 46 at the left end of the machine, from which the solid material is discharged through an opening 47. The liquid is discharged into chambers 48, from which it is discharged through suitable pipes 49.

Any air entrained in the liquid is discharged through an air trap 50 located on the top portion of the machine.

In Figs. 6 and 7, I have illustrated a modification of my invention in which auxiliary blades 431 are loosely mounted on the spiral conveyor, preferably on the plates 43, by bolts 432 which pass through openings 433 at each end of the blades 431 as illustrated in Fig. 6. The openings 433 are larger than the bolts 432, so that the blades 431 are free to move outwardly due to the action of centrifugal force against the screen 25. By providing the movable blades 431, which are thus thrown outwardly into continuous engagement with the screen, the outer portions of the movable blades are retained in the solid material, and thus avoids the necessity for the edges of the blades cutting into the solid material during the rotation thereof.

I claim:

1. In a centrifugal machine for separating solid material from a liquid, an outer rotary screen member and an inner rotary member provided with a helical worm conveyor, means for forcibly rotating the outer screen member, and means for utilizing the solid material for rotating the inner member at a higher rate of speed than the outer member.
2. In a centrifugal machine for separating solid material from a liquid, an outer rotary screen member and an inner rotary member provided with a helical worm conveyor comprising blades outwardly movable into engagement with said screen members, means for forcibly rotating the outer screen member, and means for utilizing the solid material for rotating the inner member at a higher rate of speed than the outer member.
3. In a centrifugal machine for separating

solid material from a liquid, an outer rotary screen member and an inner rotary member provided with a helical worm conveyor comprising blades loosely mounted thereon and movable outwardly into engagement with said screen members, means for forcibly rotating the outer screen member, and means for utilizing the solid material for rotating the inner member at a higher rate of speed than the outer member.

4. In a centrifugal machine for separating solid material from a liquid, an outer rotary drum member comprising a screen, means for forcibly rotating said member, an inner rotary member provided with a worm conveyor, the axis of said inner member being offset from the axis of said outer member, whereby the inner member is rotated from the outer through the medium of the solid material.

5. In a centrifugal machine for separating solid material from a liquid, an outer rotary member comprising a screen and having a shaft mounted in bearings, means for forcibly rotating said outer member, a stationary shaft mounted eccentrically with respect to said outer member, and an inner rotary member provided with a worm conveyor and having its bearings on said stationary shaft.

6. In a centrifugal machine for separating solid material from a liquid, an outer rotary member comprising a screen and having a shaft mounted in bearings, means for rotating said outer member, a stationary shaft mounted in bearings without the bearings for said outer rotary member and having its axis located below the axis of said outer rotary member, and an inner rotary member having its bearings on said stationary shaft and provided with a worm conveyor the lower edge of which is located adjacent to said screen.

COOPER SHAPLEY.

solid material from a liquid, an outer rotary screen member and an inner rotary member provided with a helical worm conveyor comprising blades loosely mounted thereon and movable outwardly into engagement with said screen members, means for forcibly rotating the outer screen member, and means for utilizing the solid material for rotating the inner member at a higher rate of speed than the outer member.

4. In a centrifugal machine for separating solid material from a liquid, an outer rotary drum member comprising a screen, means for forcibly rotating said member, an inner rotary member provided with a worm conveyor, the axis of said inner member being offset from the axis of said outer member, whereby the inner member is rotated from the outer through the medium of the solid material.

5. In a centrifugal machine for separating solid material from a liquid, an outer rotary member comprising a screen and having a shaft mounted in bearings, means for forcibly rotating said outer member, a stationary shaft mounted eccentrically with respect to said outer member, and an inner rotary member provided with a worm conveyor and having its bearings on said stationary shaft.

6. In a centrifugal machine for separating solid material from a liquid, an outer rotary member comprising a screen and having a shaft mounted in bearings, means for rotating said outer member, a stationary shaft mounted in bearings without the bearings for said outer rotary member and having its axis located below the axis of said outer rotary member, and an inner rotary member having its bearings on said stationary shaft and provided with a worm conveyor the lower edge of which is located adjacent to said screen.

COOPER SHAPLEY.

CERTIFICATE OF CORRECTION.

Patent No. 1,828,548.

October 20, 1931.

COOPER SHAPLEY.

It is hereby certified that the above numbered patent was erroneously issued to the inventor said "Shapley" whereas said patent should have been issued to "Laughlin Filter Company, of Elizabeth, N. J., a corporation of Delaware", as assignee of the entire interest in said invention, as shown by the records of assignments in this office; and that the said Letters Patent should be read with this correction therein that the same may conform to the record of the case in the Patent Office.

Signed and sealed this 29th day of November, A. D. 1932.

(Seal)

M. J. Moore,
Acting Commissioner of Patents.

CERTIFICATE OF CORRECTION.

Patent No. 1,828,548.

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