No. 718,858. PATENTED JAN. 20, 1903.

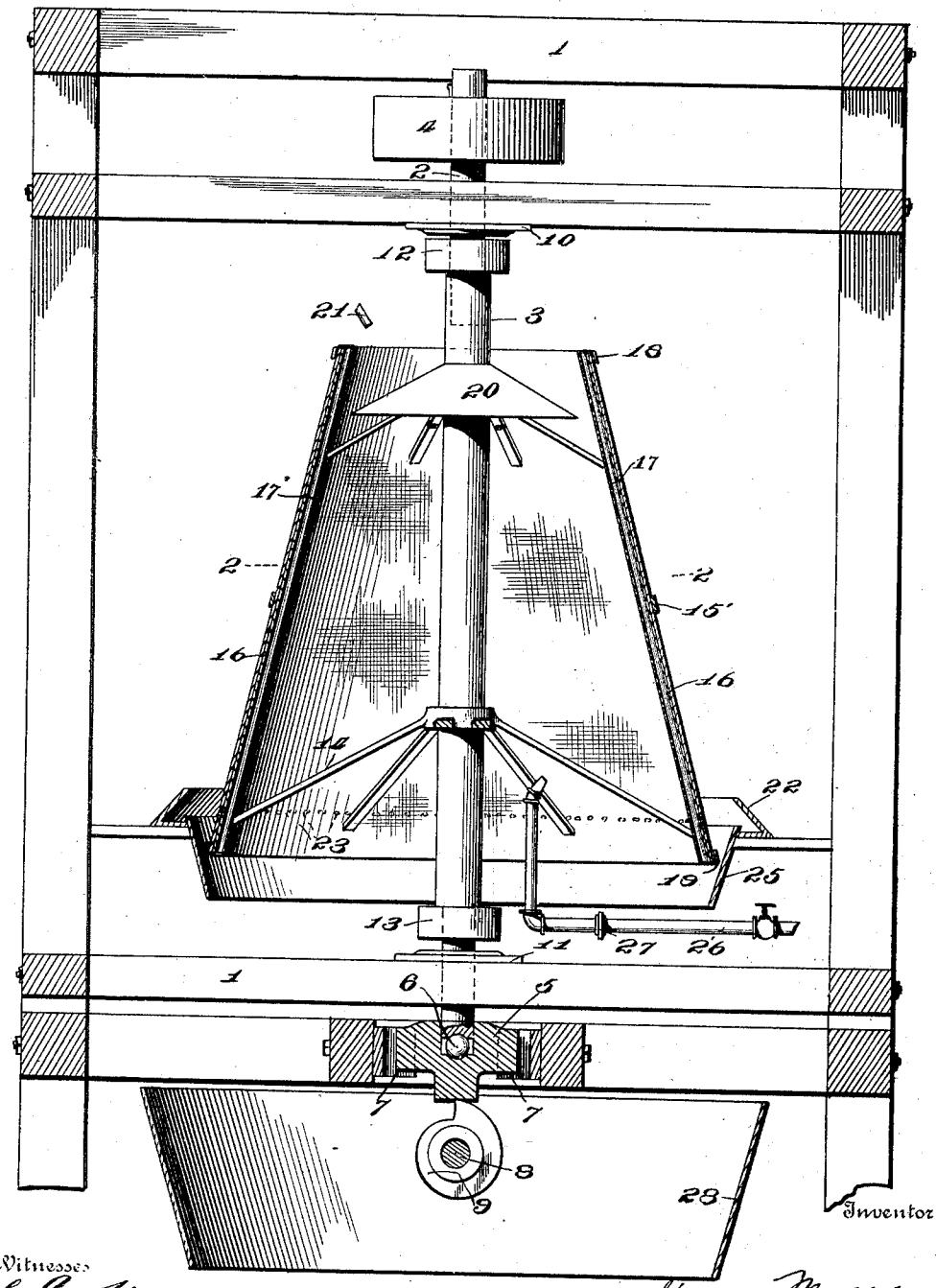
G. MOORE.

CENTRIFUGAL FILTER.

APPLICATION FILED MAR. 12, 1902.

NO MODEL. 2 SHEETS—SHEET 1.

Fig. 1.



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NO MODEL. 2 SHEETS—SHEET 2.

Fig. 2.

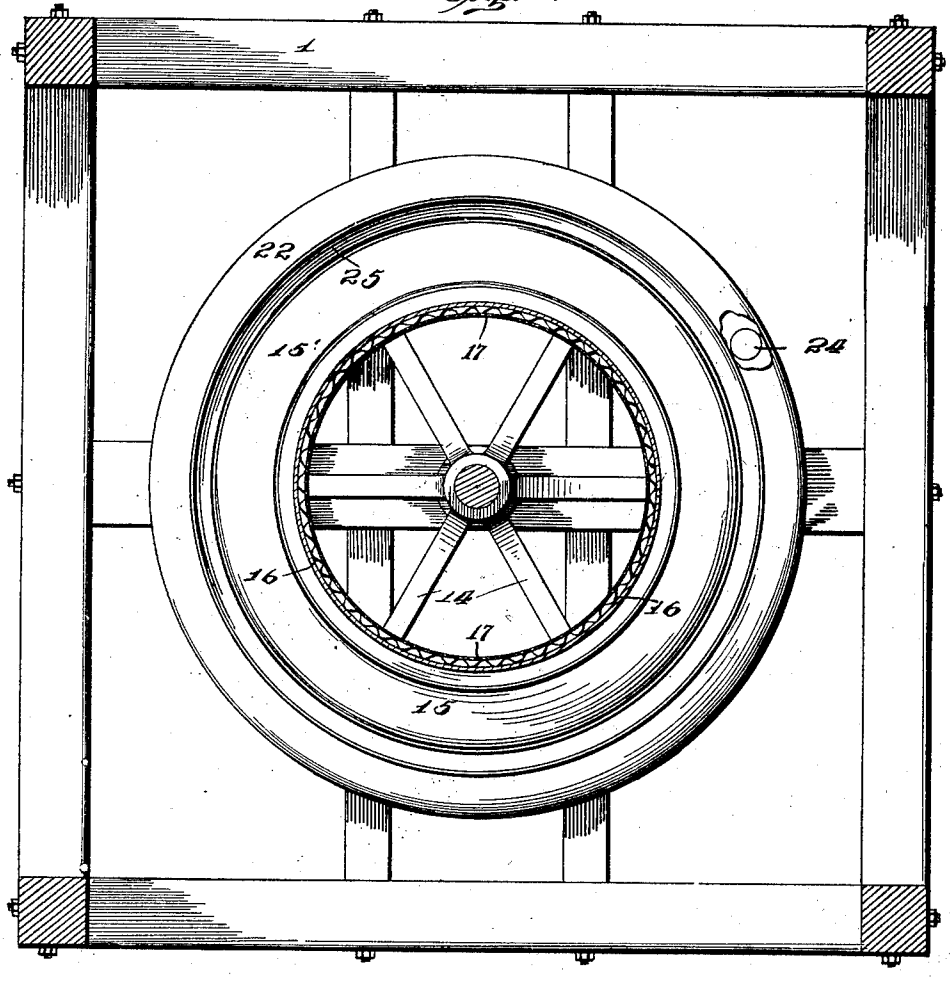
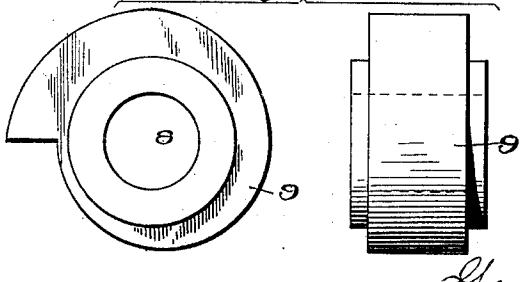


Fig. 3.



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UNITED STATES PATENT OFFICE.

GEORGE MOORE, OF SALT LAKE CITY, UTAH.

CENTRIFUGAL FILTER.

SPECIFICATION forming part of Letters Patent No. 718,858, dated January 20, 1903.

Application filed March 12, 1902. Serial No. 97,904. (No model.)

To all whom it may concern:

Be it known that I, GEORGE MOORE, a citizen of the United States, residing at Salt Lake City, in the county of Salt Lake and State of Utah, have invented certain new and useful Improvements in Centrifugal Filters; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

This invention relates to improvements in filters, and more particularly to the rotary type depending upon centrifugal force for its action.

The object in view is the separation of solids from liquids by having the mass delivered upon the surface of a revolving drum, means being provided for separating said substances through the centrifugal action caused by the rotation of said drum.

With this and other objects in view the invention consists, in combination with suitable supporting means, of a revolubly-mounted drum thereon, a filtering medium lining the walls of said drum, means for delivering the material to be filtered against said filtering medium, and means for revolving said drum.

It also consists of certain other novel constructions, combinations, and arrangements of parts, as will be hereinafter fully described and claimed.

In the accompanying drawings, Figure 1 represents a longitudinal vertical central section through a filter embodying the features of the present invention. Fig. 2 represents a transverse horizontal section taken on the plane of line 2 2 of Fig. 1. Fig. 3 represents enlarged detail side and edge views of the cam-wheel.

Referring to the drawings by numerals, 1 indicates any suitable supporting-framework carrying a shaft 2, journaled therein, said shaft 2 slidably engaging a shaft 3 and keyed or otherwise secured thereto so as to rotate the same with its rotation. A suitable pulley or other gearing, as 4, is preferably fixed to shaft 2 for rotating the same, motion being received from any desired source of power.

The lower end of shaft 3 is stepped in a cross-head 5, being preferably supported directly upon a suitable ball-bearing, as 6, said cross-head being arranged to slide in suitable guides 7, secured in the framework 1. Beneath cross-head 5 is transversely arranged a shaft, as 8, to which is keyed or otherwise fixedly secured a cam-wheel, as 9, designed to have its periphery constantly in contact with and supporting cross-head 5. Any suitable means (not shown) may be employed for rotating shaft 8, and it will be readily apparent that such movement thereof, through the medium of cam-wheel 9, will impart a jarring action to shaft 3 for purposes hereinafter mentioned. Near the upper end of shaft 3 is a plate 10, secured to the framework 1, and near the lower end thereof is a similar plate, as 11, similarly secured, and suitable collars, as 12 and 13, are secured to shaft 3 for engaging their respective plates for limiting the longitudinal movement of said shaft.

Surrounding shaft 3 and rigidly secured thereto by any preferred number of spiders, as 14 14, is a drum, as 15, preferably in the form of a truncated cone and encircled by a suitable strengthening-band, as 15′. Arranged longitudinally of the inner surface of drum 15 are corrugations or flutes 16 16, of any preferred depth and number, and secured in any preferred manner to the inner face of drum 15, inside corrugations 16, is a suitable filtering medium, as a screen or cloth 17. The preferred manner of securing filtering medium 17 is by clamping the same at each end of drum 15 by means of bands 18 and 19. Also secured to shaft 3, near the upper end of drum 15 and within the same, is a suitable (preferably conical) spreader-apron, as 20, designed to receive the material fed to the present filter from the pipe or other source of supply 21.

An annular trough, as 22, is fixedly supported in framework 1 and surrounds the lower end of drum 15, said drum being provided with a series of apertures, as 23, communicating with corrugations 16 and lying within the horizontal plane of trough 22, whereby in operation centrifugal action will tend to throw the liquid moving down said corrugations through said apertures and into trough 22. Any suitable drain, as 24, may be provided for removing the filtered liquor from trough 22. Rigidly attached to or made integral with trough 22 is an annular depending upwardly-flaring collar, as 25, for pur-

poses hereinafter described. A tube, as 26, extends within the lower end of drum 15 for supplying wash-water, a suitable joint, as 27, being provided in the length of the same for permitting adjustment of the spray from the tube, the upper end of the tube normally being directed toward the filtering medium 17. Any suitable hopper, as 28, is preferably arranged beneath the collar 25.

In operation the shaft 3, with its drum 15 and spreader 20, being revolved and at the same time subjected to the jarring action of cam-wheel 9, the solution to be filtered is fed upon said spreader through supply 21 and is thrown by centrifugal force against the filtering medium 17, the liquid thereof being caused to penetrate said medium by the same force which delivered it, so that the solids are left on the outer surface of said filtering medium, while the liquids pass through and run down corrugations 16 to apertures 23, where they are directed by centrifugal action into trough 22 and may then be removed as desired. The solids meanwhile are caused to gradually descend through the jarring action continually given drum 15 until they are flung against collar 25 and thence drop into hopper 28, from which they may be removed in any preferred manner. Just before the solids reach the end of drum 15 the spray from pipe 26 strikes them and washes therefrom every trace of the originally-contained liquor.

Among the many advantages of the present invention will be apparent the fact that a continuous feeding and filtering action may be maintained and the further fact that the solids are subjected to the filtering action (centrifugal force having a tendency to draw as much of the material as possible through medium 17) throughout the entire length of the drum.

Although I have described the present filter as having the drum with its shafts arranged in a vertical plane, it will be apparent that the same may be altered to a horizontal or other plane and that many other slight changes in the details of structure may be made fully within the spirit and scope of the present invention.

Having thus fully described my invention, what I claim as new, and desire to secure by Letters Patent, is—

1. In a mechanism of the class described, the combination with a suitable framework, of a truncated, conical drum revolubly mounted therein, and having its inner surface corrugated, the corrugations extending so as to direct the filtered solution from the top toward the bottom of the drum, a filtering medium lining the said inner surface, means for revolving said drum, and means for delivering a solution to be filtered into contact with said filtering medium, substantially as described.

2. In a mechanism of the class described, the combination with a suitable framework, of a shaft revolubly mounted therein, means for rotating said shaft, a rotating lifting means engaging the lower end of the shaft for moving it longitudinally, a drum carried by and surrounding said shaft, a filtering medium carried by said drum, means for rotating said shaft and drum, and means for delivering the solution to be filtered to the filtering medium during rotation of said drum, substantially as described.

3. A filter, comprising a revolubly-mounted drum, formed with longitudinal flutes in its inner surface, a filtering medium lining said inner surface but leaving the flutes open, means for revolving said drum, and means for supplying a solution to be filtered to said filtering medium during rotation of the drum, substantially as described.

4. A filter, comprising a suitable drum provided with longitudinal flutes in its inner surface and apertures formed in the walls of said drum, communicating with said flutes, near the lower ends thereof, an annular trough surrounding the lower end of said drum in the horizontal plane of said apertures, and a filtering medium designed to receive the solution to be filtered during rotation of the drum, whereby the solids will be retained on the outer surface of said filtering medium, while the liquids will penetrate the same, pass down the flutes and out said apertures into said annular trough, substantially as described.

5. In a mechanism of the class described, the combination with a suitable framework, of a revolubly-mounted drum therein, means for rotating said drum, means for imparting a longitudinal jarring action to said drum, means arranged longitudinally of said drum for filtering liquids supplied thereto, a fixed trough surrounding the lower end of said drum, a fixed collar also surrounding said lower end, and means for directing the liquids of the solution filtered into said trough and the solids of said solution against said collar, substantially as described.

6. In a mechanism of the class described, the combination with a suitable framework, of a shaft mounted therein, means for rotating said shaft, a cross-head slidably mounted in suitable guides in said framework, said shaft being stepped in said cross-head, means for moving said cross-head in said guides, whereby a longitudinal jarring action will be given said shaft, a filtering means arranged longitudinally of said shaft designed to have its filtering action perfected through the jarring motion of said shaft, substantially as described.

7. In a mechanism of the class described, the combination with a suitable framework, of a longitudinal movable shaft mounted therein, means for rotating said shaft, a cam-wheel supporting upon its periphery the lower end of the shaft and designed to impart a jarring longitudinal movement thereto, a fil-

tering-drum surrounding and secured to said shaft, and means for delivering the liquids to be filtered to said drum during rotation thereof, substantially as described.

8. A filtering mechanism, comprising a rotating, conical-shaped filtering means, a series of apertures being formed therein near its lower edge, an annular trough arranged outside said cone-shaped filtering means and formed with an inwardly-inclined outer wall, the said outer wall being higher than its inner wall and the said inner wall having its upper edge just below the said apertures, a downwardly-extending projection on the said inner wall forming a downwardly-converging collar for directing solid materials below the filtering means, and means for rotating the said filtering means, substantially as described.

9. A centrifugal filtering mechanism, comprising a revoluble filtering-shell, a shaft carrying the same, a non-revoluble cross-head supporting the lower end of said shaft, a vertically-disposed cam beneath the cross-head, the said cross-head resting upon the periphery thereof, and means for turning the cam so that the shaft will be raised and lowered, substantially as described.

In testimony whereof I hereunto affix my signature in presence of two witnesses.

GEORGE MOORE.

Witnesses:

A. L. HOPPAUGH,

FRANK EVANS.