No. 877,000. PATENTED JAN. 21, 1908.

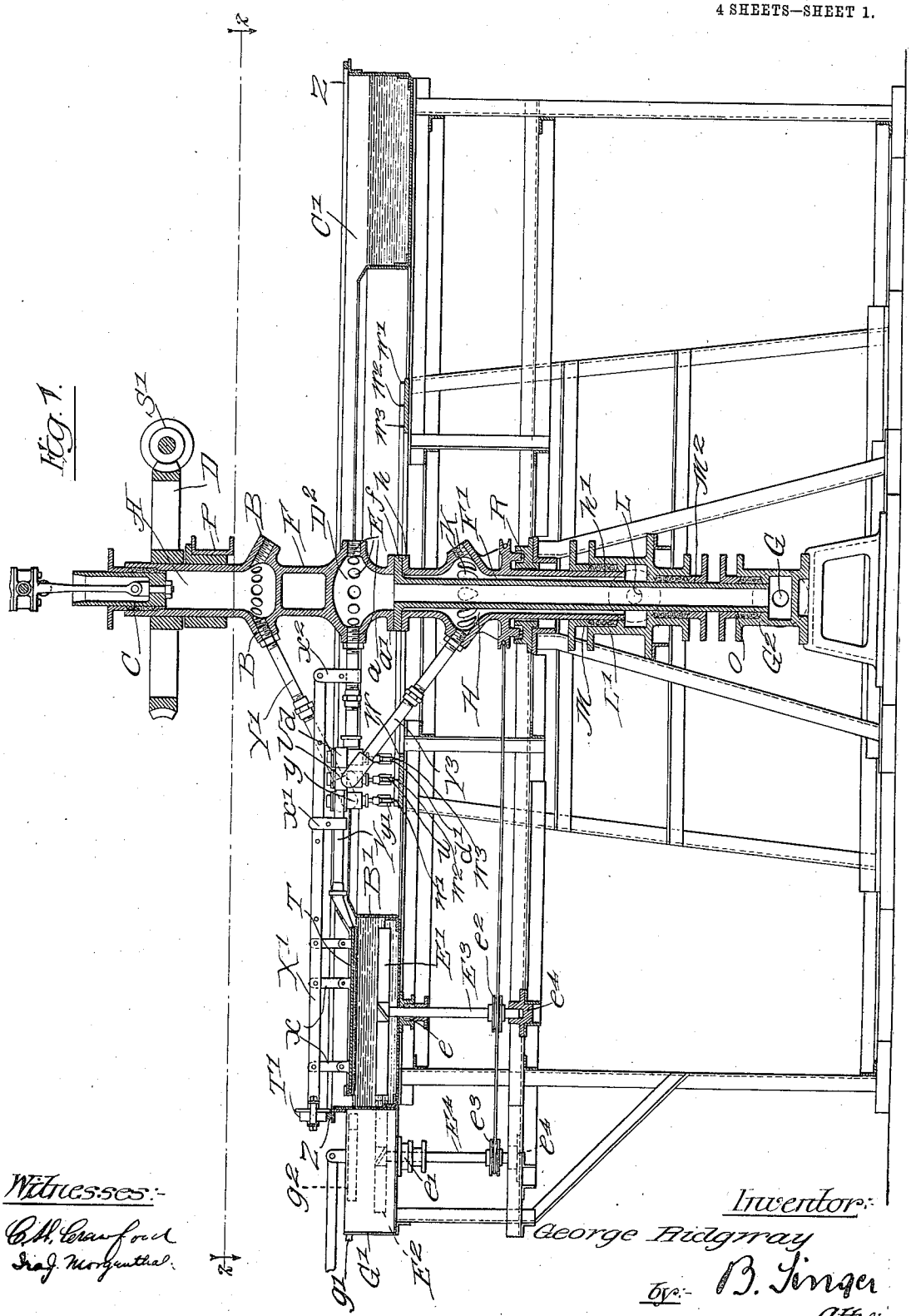
G. RIDGWAY.

FILTER.

APPLICATION FILED MAR. 12, 1906.

4 SHEETS—SHEET 1.

FIG. 1.



Witnesses:-
C. H. Crawford
Jas. J. Morgenthal.

Inventor:-
George Ridgway
by:- B. Singer
Atty:-

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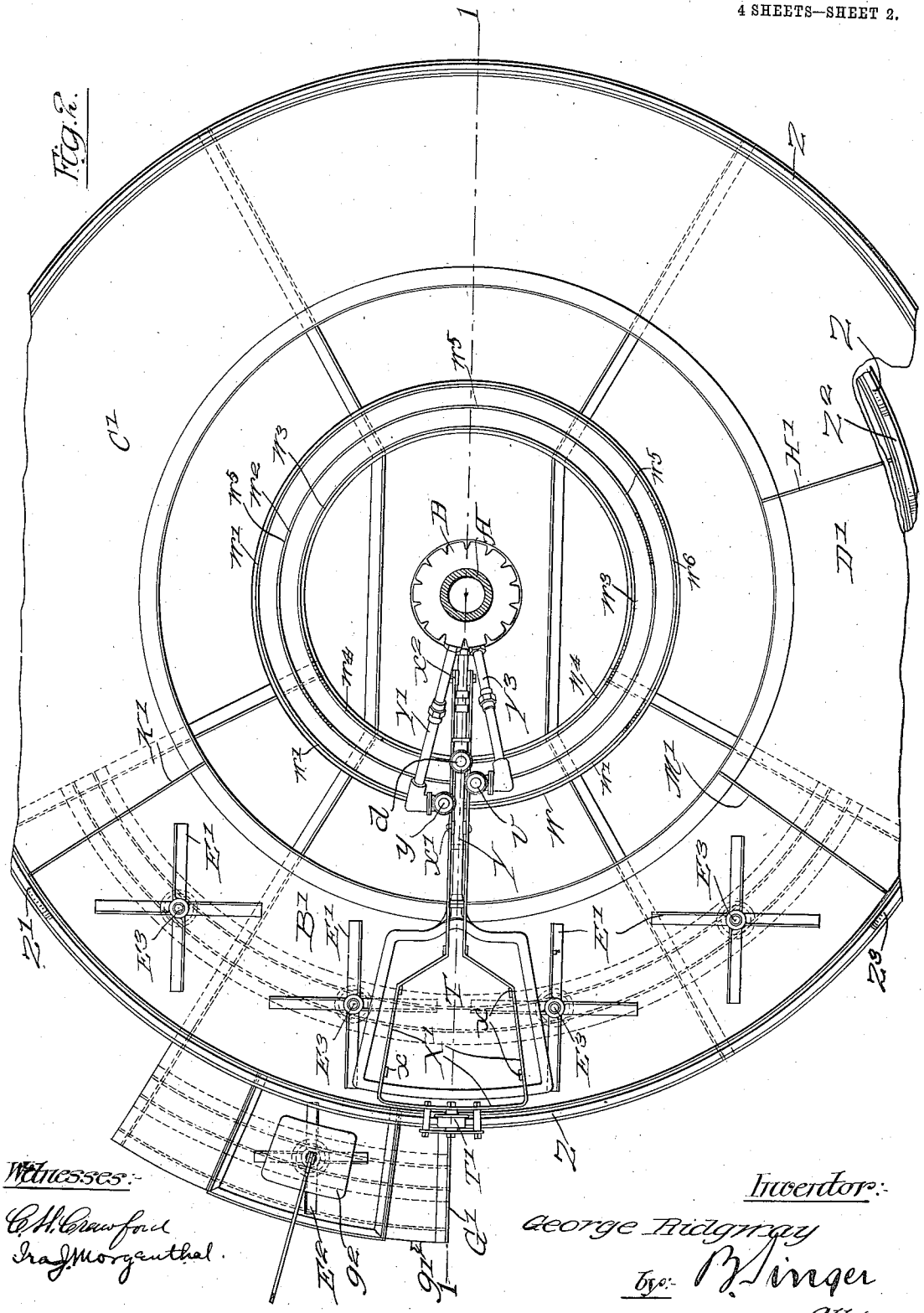
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4 SHEETS—SHEET 2.

Fig. 2.



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4 SHEETS—SHEET 3.

Fig. 5.

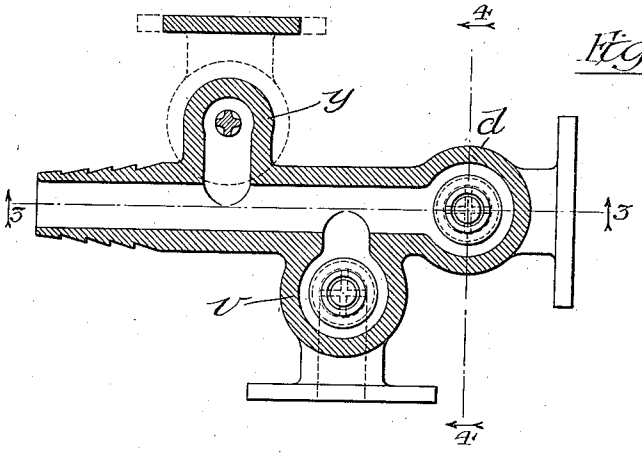



Fig. 3.

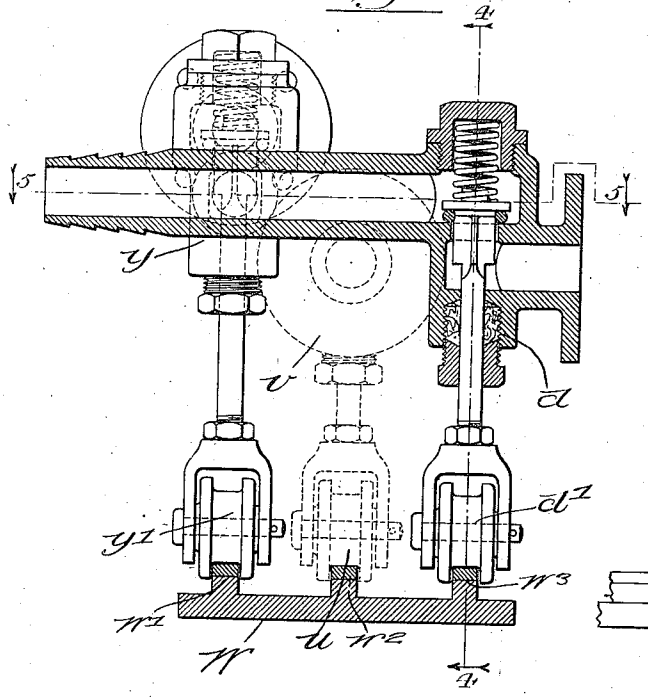
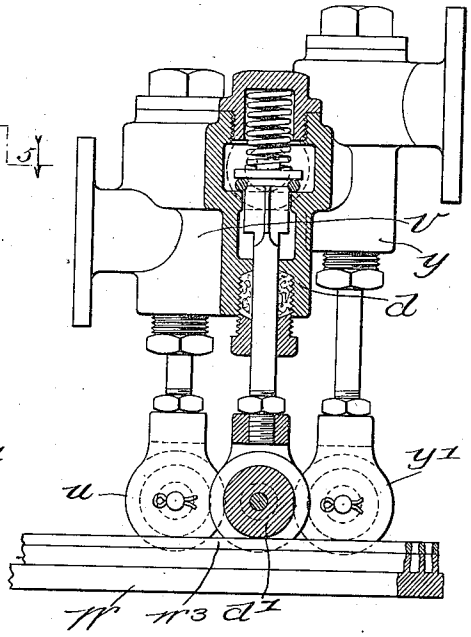



Fig. 4.




Witnesses:-

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4 SHEETS—SHEET 4.

Fig. 6.

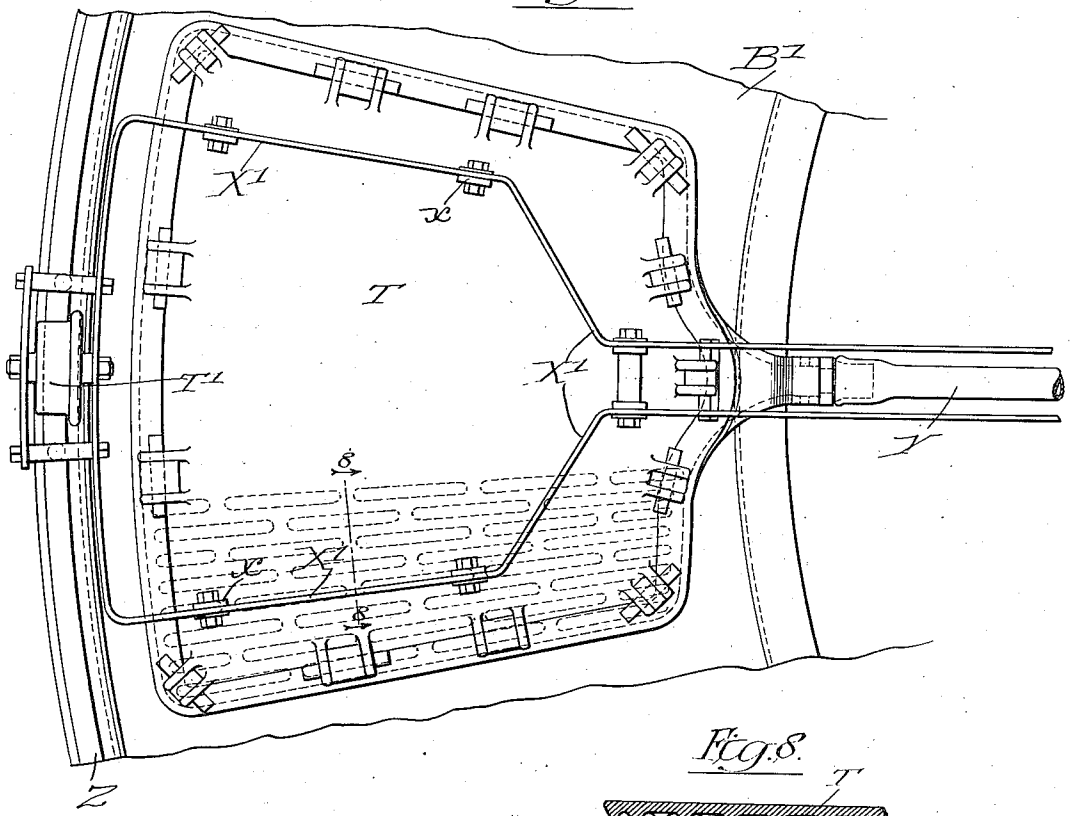



Fig. 8.

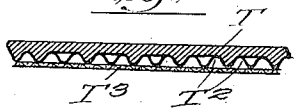
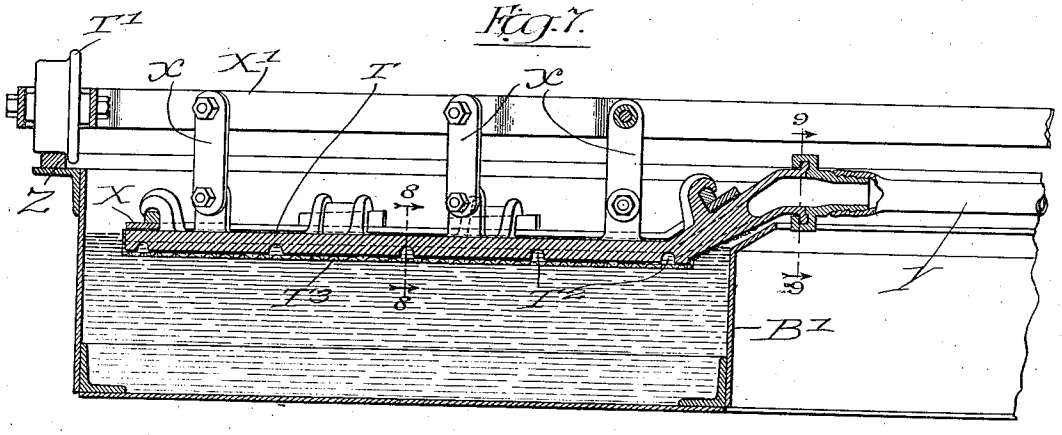



Fig. 7.




Witnesses:-

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Jno. J. Morgenthal.

Inventor:-

George Ridgway

by:- B. Singer

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# UNITED STATES PATENT OFFICE.

GEORGE RIDGWAY, OF KALGOORLIE, WESTERN AUSTRALIA, AUSTRALIA.

## FILTER.

No. 877,000. Specification of Letters Patent. Patented Jan. 21, 1908.

Application filed March 12, 1906. Serial No. 305,689.

*To all whom it may concern:*

Be it known that I, GEORGE RIDGWAY, a subject of His Majesty King Edward VII, residing at Kalgoorlie, in the State of Western Australia, Commonwealth of Australia, have invented a new and useful Atmospheric Filter, of which the following is a specification.

This invention relates to improvements in devices for separating solids and liquids, such as slimy ores, pulp and the like, and is designed to thoroughly wash the solids and to preserve the original solution separated, and also the wash solution, for subsequent treatment in order to precipitate and remove such valuable ore or material as may be contained therein.

The invention contemplates the provision of means whereby the solid bodies after being separated from the original solution and washed may be discharged from the apparatus.

The invention consists broadly in the provision of a plurality of receptacles and a device, preferably in the form of a filter, adapted to progressively coöperate with each receptacle and means acting through said device or collector for effecting the performance of different operations during the progressive movement of the collector.

The invention further contemplates the provision of devices for throwing said means into and out of operative relation with the collector while the same is in the act of performing its different functions with said receptacles.

The invention further consists in the provision of means for throwing the filter into and out of operative relation with said receptacles as the same is progressively brought into proximity thereto.

The invention will be more fully described in connection with the accompanying drawings and will be more particularly pointed out and ascertained in and by the appended claims.

In the drawings: Figure 1 is a sectional view of a filtering device embodying the main features of my invention and taken on line 1—1 of Fig. 2. Fig. 2 is a sectional view taken on line 2—2 of Fig. 1. Fig. 3 is a sectional view of an improved valve mechanism taken on line 3—3 of Fig. 5. Fig. 4 is a sectional view taken on line 4—4 of Fig. 5. Fig. 5 is a sectional view taken on line 5—5 of Fig. 3. Fig. 6 is a detail plan view on a large scale of a portion of one of the tanks and the filter tray and its supporting frame. Fig. 7 is a sectional view on line 7—7 of Fig. 6. Fig. 8 is a detail section on line 8—8 of Fig. 6.

Like characters of reference designate similar parts.

As shown:—B′ designates a receiving receptacle or tank adapted to initially receive the combined solids and liquids to be separated.

C′ designates a tank adapted to contain a suitable wash to which the solids from the receiving tank B′ are subjected.

D′ designates a dump or delivery receptacle or tank into which the solids are deposited after the same have been subjected to the wash.

T designates a device in the form of a filter adapted to be projected into the receiving tank to collect a portion of the solids and liquids therefrom said collector thereafter being projected into the wash tank to wash the collected solids and being finally brought into delivering proximity to the dump tank to discharge thereinto the washed solids. Suitable devices, presently to be described, cooperate with the filter to not only bring the same into operative relation to the several tanks but to also enable the filter to perform its several functions while in said operative relations.

Considered more specifically with reference to the drawing the tanks B′, C′ and D′ are disposed in circular order about a centrally disposed actuating mechanism and the said tanks are provided with inner and outer circular walls and are separated from each other by radial partitions K′, H′ and M′. Tank B′ is preferably provided with a plurality of agitators E′ to maintain the contents of the tank B′ in a continuously agitated state keeping the solids in suspension and generally serving to facilitate the operation of collecting the solids by the collector T. Preferably the pulp or other solution of solid and liquid is fed to the tank B′ through an auxiliary or feeding receptacle G′ located adjacent the tank B′ and preferably on a horizontal plane therewith. I have shown a pipe $g'$ discharging into the receptacle G′ and in order to render the feed automatic and maintain a substantially constant level in the tank B′ I provide a float $g^2$ in the tank G′ which may serve in any of the well known ways to cut off and cut in the supply through pipe $g'$. An agitator $E^2$ is provided in the tank G′ which serves

to prevent settling and accumulation of solids therein. The agitators E′ and E² are mounted on shafts E³ and E⁴ which project through stuffing boxes *e* and *e′* and carry at their lower ends rope sheaves *e²* and *e³* which may be driven from any convenient source of power. Bearings *e⁴* support the lower ends of said shafts E³ and E⁴.

The filter T preferably consists of a tray which is provided on its under surface with a plurality of cavities preferably in the form of a series of corrugations T². A sheet of filtering material T³ is stretched across the face of the lower corrugated surface of the tray T and is rigidly anchored at its margins by a frame X between which and the edges of the tray the filtering material is clamped. A supporting frame X′ extends beyond the tray T and carries at its outer end a wheel T′ adapted to run upon a circular track Z. The track Z is provided with elevations Z′, Z², Z³ adjacent the partitions K′, H′ and M′. As the tray is progressively moved into operative relation with the several tanks B′, C′ and D′, the wheel T′ rides upon the track Z and the raised portions serve to raise the frame X′ and lift the tray out of the tanks and permit the tray to pass freely over the partitions. The said track forms or constitutes the means for actuating or dipping the filter into the several tanks. The tray is supported from the frame X′ by pendent links *x* and the said frame extends rearwardly toward the centrally disposed actuating mechanism and is secured at *x′*, and *x²* to a support Y preferably in the form of a pipe which extends outwardly to the tray T and communicates with the corrugations or cavities therein.

Referring to the centrally disposed actuating mechanism in detail and with reference to the accompanying drawing F designates as a whole a vertically disposed rotatably mounted hollow shaft or spindle. At its upper end said shaft is provided with a bearing at P and is equipped with a cylinder A. The shaft is rotated as shown by means of a worm wheel D mounted on cylinder A which is driven by a worm S′. A piston C, adapted to be actuated from any suitable source of power, operates in cylinder A to force air outwardly through the plurality of outlets B for a purpose which will be hereinafter more fully described. The said mechanism being hereinafter referred to in connection with other operative parts as an ejecting mechanism. A chamber D² provided with a plurality of inlets E communicates through pipe F′ with an outlet G which may be connected with any desired suction means such as an air pump, this mechanism being hereinafter referred to as a solution delivery mechanism. A chamber H provided with inlets K and closed to communication with chamber D² by pipe F′ delivers to an outlet L also connected with an air pump or other like means and this mechanism will hereinafter be referred to as the wash delivery mechanism. Next referring more particularly to the structural details of the parts hereinbefore described *a* designates an upper section provided with a flange *a′* which is secured to flanges *f* and *h* of parts F′ and H. Part H is rotatably mounted at R and is provided with an extension *h′* delivering to a housing L′ which is preferably stationary, a packing gland M serves to maintain a tight joint between the parts L′ and H above the outlet L. A gland M² serves to maintain a tight joint between the housing L′ and the pipe F′ below the outlet L. The outlet G is formed in a housing G² which receives the lower end of the pipe F′ and a packing gland O is provided for maintaining a tight joint between said parts.

Reference will now be made to devices whose function it is to throw the pressure ejecting, solution, and wash delivery mechanisms into and out of operative relation with the filter during its progress from tank to tank.

The pipe Y is provided with a valve *y* connected by a pipe Y′ with cylinder A. Said valve *y* is preferably of the piston type and carries at its lower end a roller *y′*. Said pipe Y is also provided with a valve U which is connected with chamber H by a pipe Y³. The valve U is also of the piston type and is provided with a roller *u*. A third valve *d* is interposed in the pipe Y which latter connects at its inner end with chamber D² said valve *d* also being of the piston type and being provided at its lower end with a roller *d′*. A circular support W is provided with tracks *w′*, *w²* and *w³* over which the rollers *y′* and *u* and *d′* run. Said tracks are provided with raised portions *w⁴*, *w⁵* and *w⁶* so disposed with respect to the several tanks as to open the several valves at predetermined points in the operation of the device for the purpose of throwing the pressure, solution, and wash delivery mechanisms into operative relation with the filter. Inasmuch as the particular construction of said valves is not herein claimed and forms no part of the present invention the details of construction thereof are not herein shown.

The operation is as follows. Power is applied through worm S′ to rotate the centrally disposed mechanism and therewith the filter to bring the same progressively into operative relation with the several tanks. It will also be assumed that the piston C is operating and also the pumps for producing the vacuum through outlets L and G and that the tank B′ is filled to the required level with the mixture to be separated and that the tank C′ has been supplied with a suitable wash. The filter T in the position shown in Fig. 2 will be partially submerged in the contents of tank B′ and the roller *d′* will be engaged by the raised portion *w⁴* serving to

open said valve *d* and place the suction chamber $D^2$ in communication with the tray T. This operation serves to draw the solid matter of the mixture toward the filtering surface and also serves to draw the liquid therethrough into pipe Y through valve *d*, chamber $D^2$ and pipe F′ to outlet G. It will be noted that the raised portion $w^4$ is of sufficient length to maintain the valve *d* open as long as the tray T occupies a position above the tank B′. It will also be noted that the tracks *w*′ and $W^3$ are flat at this point and therefore the valves U and *y* are closed. As the collector T rotates in a clockwise direction toward the partition K′ the roller T′ strikes the raised portion Z′ and the tray T is lifted out of the tank B′ over the partition K′ and is thereafter permitted to descend into the tank C′ until it occupies a partially submerged position such as is shown in Fig. 2 in the tank B′. As soon as the tray reaches the tank C′ the valve U will have been opened by the roller *u* striking the raised portion $w^6$, the other two valves being closed by reason of the absence of raised portions on the tracks *w*′ and $w^3$ adjacent the tank C′. Upon opening the valve U the wash delivery mechanism H is thrown into communication with pipe Y through valve U and pipe $Y^3$, the latter leading to chamber H which communicates with outlet L. The wash solution is thereupon drawn through the solid particles adhering to the filtered surface of the tray and the said solid particles are washed and any part of the solid particles which pass off through the wash solution may be subsequently preciptated. As the tray approaches tank D′ the roller T′ strikes a raised portion $Z^2$ which lifts the tray out of tank C′ and raises it above the partition H′. At this point the raised portion $w^5$ is discontinued or terminated and the valve U is closed. The roller *d*′ of the valve *d* strikes the raised portion $w^6$ opening the valve *d* and also throwing the pipe Y through valve *d* and pipe Y′ into communication with cylinder A which operation serves through the outwardly forced air therefrom to dislodge the solid particles from the filtering surface of the tray and discharge the same into the receptacle D′.

I claim:—

1. A device of the class described comprising in combination, a plurality of tanks arranged in a circular order, a filter, a frame therefor provided with a roller, a track surrounding said tanks and provided with raised portions, said track being adapted for engagement by said roller to support said frame and raise and lower said filter out of and into said tanks, and means for moving said filter abreast of said tanks.

2. A device of the class described comprising in combination, a plurality of tanks, a track adjacent said tanks provided with raised portions, a filter, a frame supporting said filter and provided with a roller adapted to ride upon said track whereby the filter is supported and raised out of and lowered into said tanks, and means for moving said filter abreast of said tanks.

3. A device of the class described comprising in combination, a plurality of tanks, a track adjacent said tanks provided with raised portions, a filter provided with a roller engaging said track whereby said filter is supported in and raised out of and lowered into said tanks, and means for moving said filter abreast of said tanks.

4. A device of the class described comprising in combination, a plurality of tanks, arranged in circular order, a circular track adjacent said tanks provided with raised portions, a filter provided with a roller engaging said track whereby said filter is supported in and raised out of and lowered into said tanks, and means for moving said filter abreast of said tanks.

5. A device of the class described comprising in combination, a plurality of tanks arranged in circular order, a filter, means for moving said filter abreast of said tanks, and automatic means for supporting said filter in said tanks and raising the same out of one tank and lowering it into another tank.

6. A device of the class described comprising in combination, a plurality of tanks, a filter, means for moving said filter abreast of said tanks, and automatic means for supporting said filter in said tanks and raising the same out of one tank and lowering it into another tank.

7. A device of the class described comprising in combination, a plurality of tanks, a filter, means for moving said filter abreast of said tanks, ejecting solution and wash delivery mechanisms communicating with said filter, independent valves for controlling communication between said filter and each of said mechanisms, rollers for controlling said valves, and tracks engaged by said rollers and provided with raised portions whereby the several mechanisms may be thrown into communication with said filter when the same communicates with the several tanks.

8. A device of the class described comprising in combination, a tank, a filter, means for moving said filter abreast of said tank, mechanism for drawing the contents of said tank through said filter, a valve controlling communication between said filter and mechanism, said valve being provided with a roller, and a track adapted to be engaged by said roller and provided with a raised portion adjacent said tank for establishing communication between said filter and mechanism.

9. A device of the class described comprising in combination, a plurality of tanks, a

filter, means for moving said filter abreast of said tanks, separate mechanisms communicating with said filter to draw the contents of said tanks therethrough, a valve for each of said mechanisms controlling communication between the same and said filter, a roller for each of said valves, and tracks adapted to be engaged by said rollers and provided with raised portions adjacent said tanks for throwing selected mechanisms into communication with said filter when the same is abreast of selected tanks.

10. A device of the class described comprising in combination, a plurality of tanks, a filter, means for moving said filter abreast of said tanks, separate mechanisms communicating with said filter to draw the contents of said tanks therethrough, a valve for each of said mechanisms controlling communication between the same and said filter, and means for throwing selected mechanisms into communication with said filter when the same is abreast of selected tanks.

11. A device of the class described comprising in combination, a plurality of tanks, a filter, means for moving said filter abreast of said tanks, separate mechanisms communicating with said filter to draw the contents of said tanks therethrough, a valve for each of said mechanisms controlling communication between the same and said filter, and automatic means controlling said valves for throwing certain mechanisms into communication with said filter when the same is abreast of certain of the tanks.

12. A device of the class described comprising in combination, a plurality of tanks, a filter, means for moving said filter abreast of said tanks, separate mechanisms communicating with said filter to draw the contents of said tanks therethrough, a valve for each of said mechanisms controlling communication between the same and said filter, means for throwing certain mechanisms into communication with said filter when the same is abreast of certain of said tanks, and means for supporting said filter abreast of said tanks and raising the same out of and lowering the same into said tanks.

13. A device of the class described comprising in combination, a plurality of tanks, a filter, means for moving said filter abreast of said tanks, separate mechanisms communicating with said filter to draw the contents of said tanks therethrough, a valve for each of said mechanisms controlling communication between the same and said filter, means for throwing certain mechanisms into communication with said filter when the same is abreast of certain of said tanks, and automatic means for supporting said filter abreast of said tanks and raising the same out of and lowering the same into said tanks.

14. A device of the class described comprising in combination, a plurality of tanks, a filter, means for moving said filter abreast of said tanks, separate mechanisms communicating with said filter to draw the contents of said tanks therethrough, a valve for each of said mechanisms controlling communication between the same and said filter, automatic means for throwing certain mechanisms into communication with said filter when the same is abreast of certain of said tanks, and automatic means for supporting said filter abreast of said tanks and raising the same out of and lowering the same into said tanks.

15. A device of the class described comprising in combination, a plurality of tanks, a filter, means for moving said filter abreast of said tanks, separate mechanisms communicating with said filter to draw the contents of said tanks therethrough, and automatic means for throwing certain mechanisms into communication with said filter when the same is abreast of certain of said tanks.

16. A device of the class described comprising in combination, a plurality of tanks, a filter, means for moving said filter abreast of said tanks, separate mechanisms communicating with said filter to draw the contents of said tanks therethrough, and separate automatic means for each mechanism whereby the several mechanism may be thrown into communication with the several tanks.

17. A device of the class described comprising in combination, a plurality of tanks, a filter, means for moving said filter abreast of said tanks, mechanism communicating with said filter to draw the contents of said tanks therethrough, and automatic means supporting said filter in communication with said tanks and raising the same out of and lowering the same into said tanks.

18. A device of the class described comprising in combination, a plurality of tanks arranged in circular order, a filter, centrally disposed operating mechanism supporting said filter and comprising devices adapted to draw the contents of said tanks through said filter, automatic means interposed between said device and filter for controlling communication therebetween, and means for driving said supporting mechanism.

19. A device of the class described comprising in combination, a plurality of tanks, a filter, operating mechanism supporting said filter and comprising devices for drawing the contents of said tanks through said filter, automatic means interposed between said device and filter for controlling communication therebetween, and means for driving said mechanism.

20. A device of the class described comprising in combination, a plurality of tanks arranged in circular order, a filter, centrally disposed mechanism supporting said filter and comprising devices communicating with said filter for drawing the contents of the tanks therethrough, means for driving said

mechanism to rotate said filter abreast of said tanks, and automatic means controlling communication between said filter and said devices.

21. A device of the class described comprising in combination, a plurality of tanks arranged in circular order, a filter, centrally disposed mechanism supporting said filter and comprising devices communicating with said filter for drawing the contents of the tanks therethrough, means for driving said mechanism to rotate said filter abreast of said tanks, and automatic means for raising said filter out of said tanks and lowering the same thereinto.

22. A device of the class described comprising in combination, a plurality of tanks, a filter, mechanism supporting said filter and comprising devices communicating with said filter for drawing the contents of the tanks therethrough, means for driving said mechanism to operate said filter abreast of said tanks, and automatic means controlling communication between said filter and said device.

23. A device of the class described comprising in combination, a plurality of tanks, a filter, mechanism supporting said filter and comprising a device communicating with said filter for drawing the contents of the tanks therethrough, automatic means controlling communication between said filter and said device, and means for driving said mechanism to operate the filter abreast of said tanks.

24. A device of the class described comprising in combination, a plurality of tanks, a filter, mechanism supporting said filter and comprising a device communicating with said filter for drawing the contents of the tanks therethrough, and automatic means for raising the filter out of said tanks, and lowering the same thereinto.

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

GEORGE RIDGWAY.

Witnesses:
WILLIAM GEORGE MANNERS,
LANCELOT DE MOLE.