

March 18, 1947.

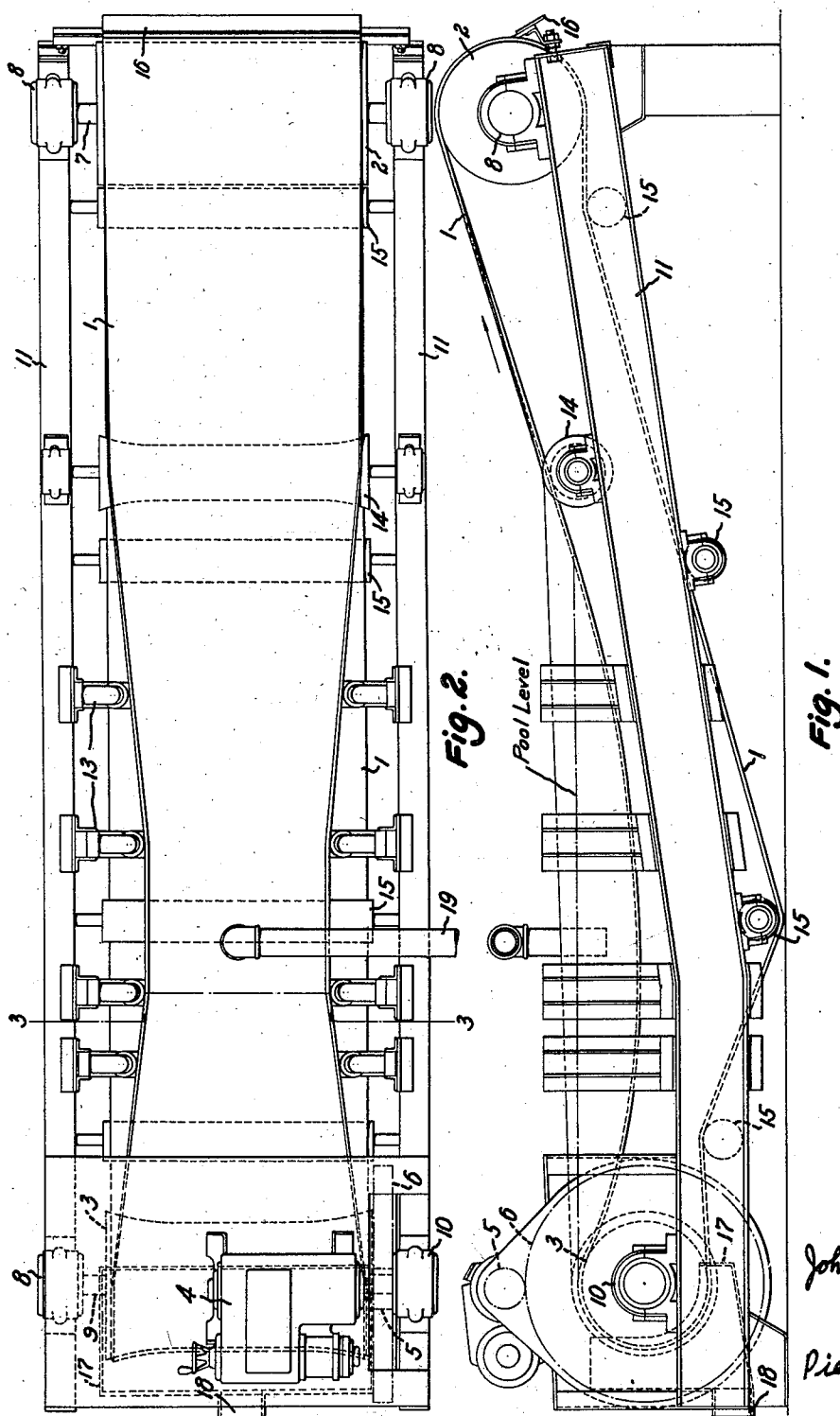
J. H. V. FINNEY, JR

2,417,477

BELT TYPE SOLID SEPARATOR

Filed July 11, 1944

2 Sheets-Sheet 1



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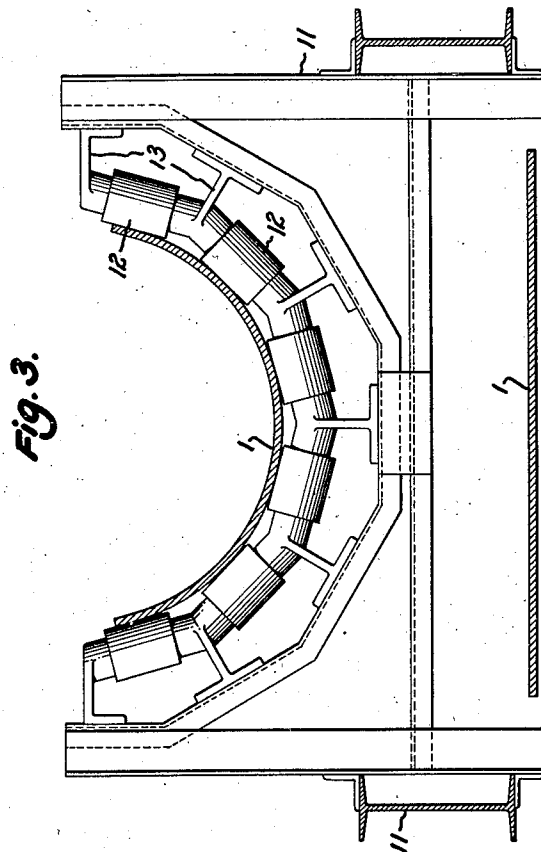
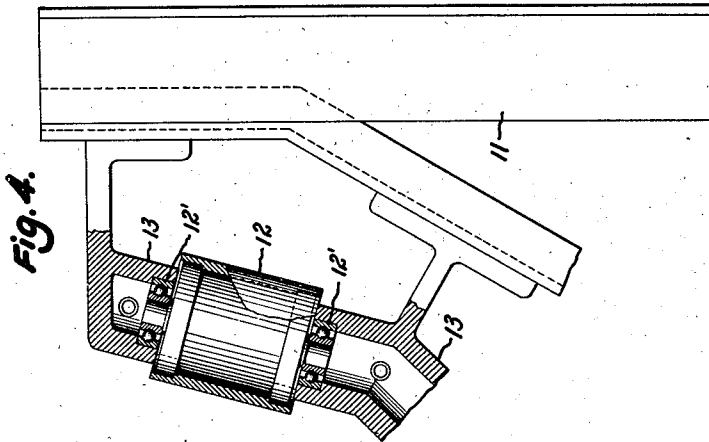
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UNITED STATES PATENT OFFICE

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BELT TYPE SOLID SEPARATOR

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2 Claims. (Cl. 209-428)

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This invention relates to apparatus for separating solid particles from liquid suspensions. The separating device of the invention may be utilized as a dewaterer or as a classifier.

Mechanical classifiers for the separation of coarse from fine, or heavy from light, particles commonly include a pool into which a slurry of the material to be separated is fed and means for removing the settled solids from the pool. The essential classifying action is based on the differential rates of settling of the particles in the pool, the fines remaining in suspension in the liquid and passing out of the pool with the overflow. Likewise essential to the operation of the classifier is the provision of means for the removal, preferably continuously, of the settled material from the pool. In the mechanical classifiers heretofore proposed, this removal of the settled solids has been effected by means of endless drags, oscillating rakes, spiral ribbon conveyors and the like.

However, the action of these devices for removing the settled solids directly interferes with the effectiveness of the settling operation in the pool, which requires for efficient and sharp separation of the material substantial absence of agitation. The operation of the pool is therefore disturbed by the action of the conveyor devices. The agitation causes high pulp densities to build up in the bottom of the pool, reducing the sharpness and effectiveness of separation. To overcome this condition increased pool volumes are required.

A principal purpose of the invention is to provide a material separating device in which the settled material is removed from the bottom of the pool as fast as it settles without substantial agitation of the pool.

Another purpose of the invention is to provide a material separating device in which the settling operation and the removal of the settled materials are carried out at maximum efficiency without interfering one with the other.

A further purpose of the invention is the provision of a material separating device in which the receptacle for the settling is formed by the conveying means for the removal of settled solids.

These and other purposes and advantages are achieved by the provision of a separating device comprising an endless flexible belt, one portion of which is laterally warped out of its plane position to provide a pool-forming receptacle and means driving said belt upwardly from the location of the receptacle to a level higher than the overflow level of the receptacle whereby solids settling on the belt from the pool are continuous-

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ly removed from the pool without substantial agitation of the slurry in the pool.

The invention will be more particularly described for the purpose of illustration with reference to the accompanying drawings in which:

Fig. 1 is a side elevation of a separating device embodying the principles of the invention;

Fig. 2 is a plan view of the separating device of Fig. 1;

Fig. 3 is a transverse section on line 3-3 of Fig. 2, and

Fig. 4 is a fragmentary detail in partial section of a troughing idler pulley of the invention.

In the figures, 1 is an endless belt, preferably of rubber, mounted on a flat-faced head pulley 2 and a concave-faced tail pulley 3. The belt is driven in the direction indicated by the arrow in Fig. 1, by the rotation of the tail pulley 3 by means of motor 4, pinion 5 and gear 6.

The head pulley 2 is mounted on shaft 7 carried in ball bearing pillow blocks 8 and the tail pulley 3 is mounted on shaft 9 carried in ball bearing pillow blocks 10. The pillow blocks are mounted on frame 11.

Adjacent the concave-faced tail pulley are a series of troughing idler pulleys 12, mounted in ball bearings 12' in brackets 13 carried on frame 11 and positioned to warp the sides of the belt upwardly to form a pool receptacle. Preferably, the troughing idlers are so positioned that the edges of the belt throughout the pool area are at approximately the same level as the edges of the belt on the concave-faced tail pulley, so that the center portion of the concave-faced tail pulley forms an overflow weir for the settling pool.

A concave-faced, conveying idler pulley 14 is positioned between the pool area and the head pulley 2. Other suitably spaced idler pulleys 15 are positioned along the bottom flight of the belt.

A belt scraper 16 is provided at the head end of the belt.

At the tail end a sump 17 with a slimes outlet 18 is provided.

The surface of the belt may be corrugated or provided with upstanding flexible rubber clips.

In operating the device as a classifier, a slurry of coarse and fine material to be separated is fed continuously into the pool through feed line 19. In the pool the coarse material sinks to the bottom and comes to rest on the conveyor belt which carries the coarse material upward out of the pool over the head pulley to the point of discharge at the belt scraper.

Fine material which remains in suspension flows with the liquid medium to the point of

discharge over the concave-faced tail pulley into the sump and out through the slimes outlet.

Independent agitation to regulate the amount of fines which remains in suspension may be provided in the pool if desired. The speed of travel of the belt is determined solely by the rate of settling of the coarse material and is adjusted to remove the settled material without any substantial accumulation in the bottom of the pool.

When using the separating device of the invention as a dewaterer, the solid particles which settle in the pool are conveyed out by the belt, while slimes and foreign material are washed away and carried out of the pool over the overflow into the sump.

I claim:

1. A separating device comprising an endless flexible belt, means supporting said belt for continuous travel through a path directed upward at an angle to the horizontal including a substantially flat-faced pulley at the upper end of the path and a concave-faced pulley at the lower end of the path, and means for warping the belt in the lower portion of said path into a receptacle providing a settling pool of substantial depth, the edges of the belt throughout said warped portion being not substantially lower than the edges of the belt on said concave-faced pulley and the center of the concave-faced pulley being substantially lower than the edges of the belt throughout said warped portion whereby liquid from the pool overflows over the center of said concave-faced pulley.

2. A separating device comprising an endless flexible belt, means supporting said belt for continuous travel through a path directed upward at an angle to the horizontal including a substantially flat-faced pulley at the upper end of the path and a concave-faced pulley at the lower end of the path, and a plurality of idler pulleys positioned to warp the belt in the lower portion of said path into a receptacle providing a settling pool of substantial depth the edges of the belt throughout said warped portion being not substantially lower than the edges of the belt on said concave-faced pulley and the center of the concave-faced pulley being substantially lower than the edges of the belt throughout said warped portion whereby liquid from the pool overflows over the center of said concave-faced pulley.

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