

MACHINERY FOR SEPARATING MATERIALS OF DIFFERENT SPECIFIC GRAVITY.

Patented Jan. 21, 1913.

1,050,991.



INVENTOR:

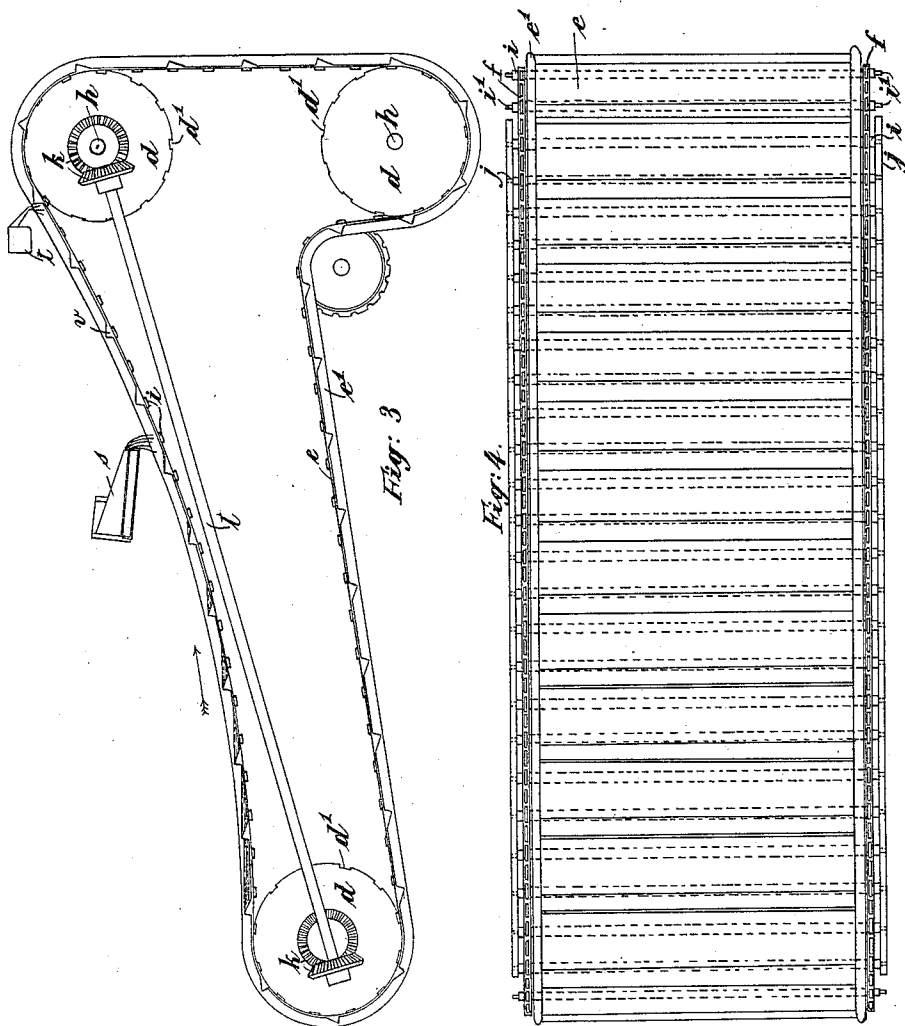
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2 SHEETS—SHEET 2.



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MACHINERY FOR SEPARATING MATERIALS OF DIFFERENT SPECIFIC GRAVITY.

1,050,991.

Specification of Letters Patent.

Patented Jan. 21, 1913.

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To all whom it may concern:

Be it known that I, PERCY JOHN OGLE, subject of the King of Great Britain and Ireland, residing at 13 Finsbury Circus, in the city of London, England, have invented new and useful Improvements in and Relating to Machinery for Separating Materials of Different Specific Gravity, of which the following is a specification.

This invention relates to machines for separating materials of different specific gravity and to that class in which a flexible belt with riffles is adapted to so operate as to cause the damming back effect of the riffles to gradually diminish.

The object of the invention is in the first place the improved construction of an endless belt having the above characteristic and in the second place the provision of improved means for supporting and driving said belt so as to produce the characteristic effect desired.

The invention consists in the provision of an endless belt provided on its operative surface with a series of riffles transversely disposed and of such a form as to produce a damming back surface which by the amount of inclination given to the belt can be varied from the maximum required to zero and with a plain smooth surface at the bottom of the riffles. The longitudinal section of such a belt would be practically of a saw tooth character with teeth having a long base and shallow depth or equivalently teeth disposed a considerable distance from one another with a straight line joining them. An example of a practical section is a riffle $\frac{3}{16}$ inch high at one end and tapering to nothing and $2\frac{3}{4}$ inches wide disposed on a plain belt surface at a distance of $7\frac{3}{4}$ inches apart. The direction of motion of the belt is normal to the direction of the riffles.

The next part of my invention consists in the provision of means for supporting and driving the belt so that its operative surface starts in a more or less horizontal position and as it travels the said surface gradually assumes a position of greater inclination until just before the end of its operative path the damming effect of the riffles has partially or entirely disappeared. To carry out this effect I mount the belt upon suitable supports which have an inclination gradually varying from at or near zero at the end where the function of the belt is

started until it reaches the maximum inclination at the finishing end so that the damming back effect of the riffles has practically disappeared. I find that guides of varying curvature to suit the above conditions in conjunction with belt supporting means coacting with said guides enables the belt to take a definite and predetermined path of gradually increasing inclination. I prefer to exert the driving effort on the belt supporting means rather than on the belt itself and by arranging the driving effort to be transmitted at both ends of the belt in a positive manner where it passes over its carrying pulleys all difficulty as to the sagging of the belt from variation in driving effort is entirely avoided.

The material to be treated is fed on to the belt at some point intermediate of the ends of its operative surface and the wash water is delivered at the end where the concentrates reach their final stage of separation. The belt travels from the more or less horizontal position to that of the inclined position.

The belt in addition to its longitudinal motion has a transverse or equivalent motion given to it of the same character which obtains in such devices of which the Frue vanner is a typical example and the concentrates are collected in a similar way.

In order that the invention may be the better understood I will now proceed to describe the same in relation to the accompanying drawings and to the letters and figures marked thereon.

Like letters refer to like parts in the various figures.

Figure 1 is a side view of a machine constructed in accordance with my invention. Fig. 2 is a sectional end view of same. Fig. 3 is a diagrammatic view on an exaggerated scale of the endless belt, to clearly show the curve of the same and the manner in which the damming back effect of the riffles of the belt is gradually reduced from maximum to zero. Fig. 4 is a plan of the belt. Fig. 5 shows a sectional view of the edge of the belt illustrating the fence or rib of ordinary construction. Fig. 6 is a similar view illustrating a hollow fence or rib adapted for inflation by fluid pressure to enable the belt to travel easily around the supporting rollers.

From supports *a* the frame *b* is carried by

depending rods *c* and in said frame are mounted carrying rollers *d* around which the endless belt *e* is disposed. At each side of the belt *e* is arranged a chain *f* which passes
 5 around a sprocket wheel *g* mounted on the axle *h* of each of the rollers *d*. The under side of the belt *e* has a series of bars *i* transversely arranged which bars are attached to or form part of the chains *f*. Transverse
 10 grooves *d*¹ are provided across the periphery of the rollers *d* to take the bars *i* and permit the belt to be on the periphery of the roller. At each end of the bars *i* is a pin *i*¹ which engages with grooved guides *j* carried
 15 on each side of the frame *b* and such guides are formed with the necessary curvature so as to guide and support the belt *e* as far as its upper or operative surface is concerned in order to conform to the conditions of in-
 20 creasing inclination as represented in Fig. 3. In order to positively drive the sprocket wheels *g* in a definite relation to one another so that the belt *e* has a constant length of operative surface between the sprocket
 25 wheels *g* and mechanical connecting and driving means are provided such for example as bevel wheels *k* and shaft *l*.

The motion of the belt *e* is effected by a worm *m* and worm wheel *m*¹ driven by a
 30 variable speed belt drive *n* from a main shaft *o* having fast and loose pulleys *p*. The shaft *o* carries an eccentric *q* the strap of which is pivotally connected to the frame *b* through the arm *r* so as to give the frame
 35 a vanning motion. A pulp feeding device *s* and wash water delivery device *t* are provided on the upper side of the belt *e* and a tank *u* is arranged where the belt travels in a downward direction to receive the con-
 40 centrates. The belt *e* is provided with a fence or rib *e*¹ at each side which may be of the simple form shown in Fig. 5 or of the hollow form adapted for inflation by fluid pressure as shown in Fig. 6.

45 The smooth surface of the belt *e* has at intervals along its length a series of ribs *v* the damming surfaces of which are disposed at an obtuse angle to the smooth surface of the belt. It will be seen from Fig. 3 that
 50 the depth of the pool of liquid at the lower end is considerable and as the inclination of

the belt *e* increases the depth of the succeeding pools decreases until at the upper end the damming back surface is horizontal and the depth of the pool is zero. In order
 55 to insure the liquid draining quite away the damming back surface of the rib just before passing over the top roller may have a slightly reverse inclination. The drained concentrates are then carried over the top
 60 roller and fall into the tank *u* when the belt is passing around the bottom roller.

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

65 1. An apparatus for separating materials of different specific gravity comprising in combination an endless traveling belt, a series of riffles disposed at intervals transversely across the belt at right angles to the
 70 direction of travel of the belt, rotary means for supporting and driving said belt, means adapted to guide the operative part of the belt in a gradually increasing curvilinear path in the direction of its travel, and
 75 means for guiding the operative part of the belt, substantially as described.

2. An apparatus for separating materials of different specific gravity comprising in
 80 combination an endless traveling belt, a series of riffles disposed at intervals transversely across the belt at right angles to the direction of travel of the belt, rotary means for supporting and driving said belt, a driving
 85 chain arranged at each side of and connected to said belt at intervals along its length, rollers for carrying and driving the chain and belt, curved guiding means for controlling the curvilinear path of the operative part of the belt at a constantly in-
 90 creasing gradient and means by which the carrying and driving rollers receive a simultaneous positive drive so as not to interfere with the curvilinear path of the operative part of the belt, substantially as described. 95

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

PERCY JOHN OGLE.

Witnesses:

O. J. WORTH,
 TRACY LAY.