

Dec. 20, 1949

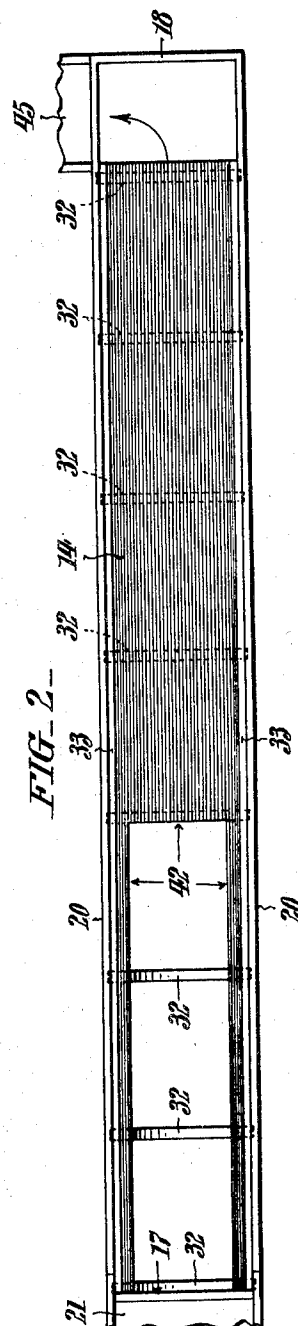
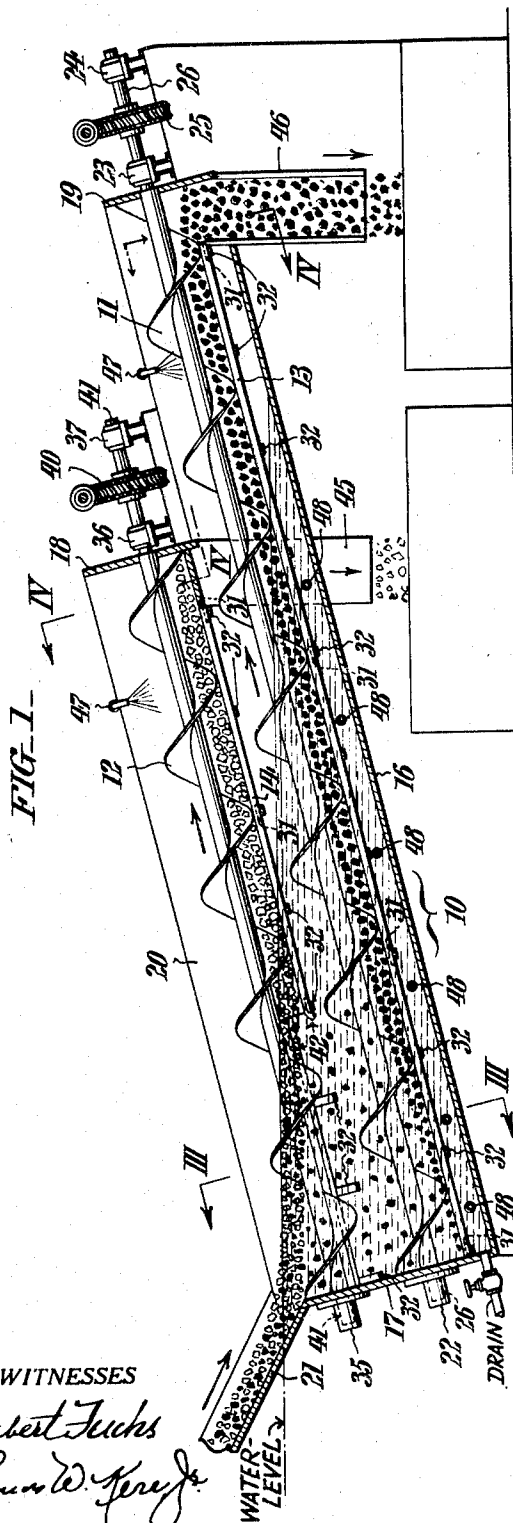
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2,491,912

APPARATUS FOR SEPARATING MATERIALS

Filed Jan. 30, 1947

2 Sheets-Sheet 1



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FIG. 3

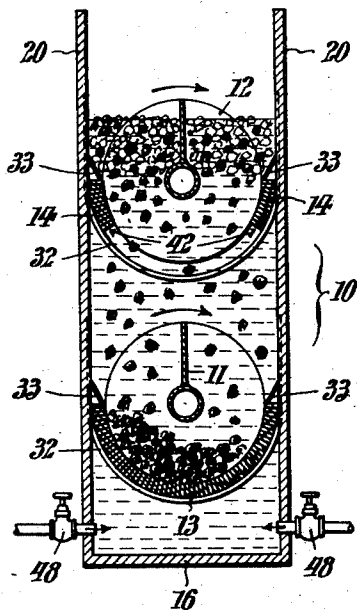


FIG. 4

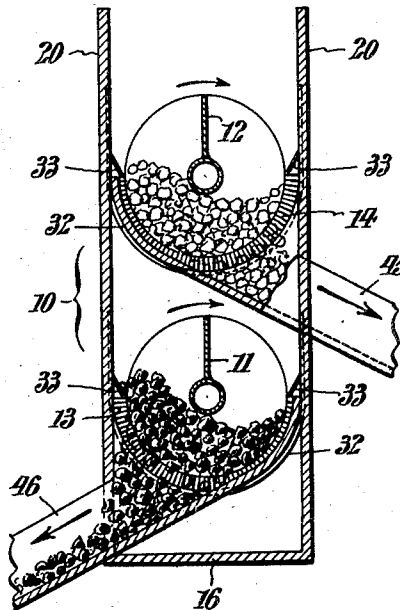
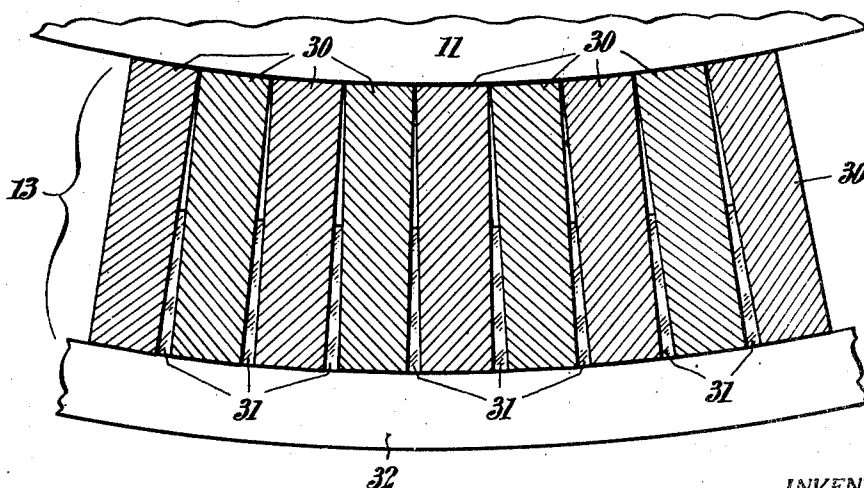


FIG. 5



WITNESSES

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2,491,912

APPARATUS FOR SEPARATING MATERIALS

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Application January 30, 1947, Serial No. 725,354

4 Claims. (Cl. 209—393)

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My invention relates to an apparatus for separating materials of different specific gravities by immersing them in a fluid having a specific gravity which is intermediate the specific gravities of the materials being separated.

It is now no longer new to provide such an apparatus in the form of superposed conveyors dipping into a vessel containing the separating fluid and adapted to receive the materials for separation at various levels and thereafter to convey the separated materials from the separating fluid as required. In devices of this type, the conveyors usually operate in troughs which are perforated to permit the separation fluid to be drained off as the separated materials are progressed along by the conveyors. The efficient drainage operation of such a trough has an important bearing on the successful functioning of the apparatus as a whole.

Accordingly one object of my invention is the provision of an apparatus of the type mentioned in which clogging and choking of the drainage operation is substantially eliminated. Another object of my invention is the attainment of the first mentioned objective by as simple and economical means as possible.

Still further advantages and objects of my invention will become apparent from the following detailed description of a preferred form of my invention which is shown illustratively in the accompanying drawings.

Fig. 1, of the drawings, shows a longitudinal sectional view of a preferred form of my invention.

Fig. 2 shows a plan view of the top trough of Fig. 1.

Fig. 3 shows a transverse section taken as indicated by the arrows III—III in Fig. 1.

Fig. 4 shows a transverse staggered section taken as indicated by the arrows IV—IV in Fig. 1.

Fig. 5 is a partial transverse section of a trough showing the assembly of trough bars and spacer bars.

In describing the preferred form of my invention illustrated in the drawings, a specific terminology will be resorted to for the sake of clarity. However, it is to be understood that there is no intention of being limited to the specific terms so selected, but on the contrary each specific term is intended to include all technical equivalents which operate in a similar manner to accomplish a similar purpose.

Referring now to Fig. 1, it will be seen that the invention may be resolved into the following main components: an inclined tank 10, a lower helicoid conveyor 11, an upper helicoid conveyor

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12 and troughs or drainage sieves 13 and 14 associated with the lower and upper helicoid conveyors 11 and 12 respectively. The inclined tank 10 is of a conventional fluid tight construction having an inclined bottom member 16, end members 17, 18 and 19 and side members 20 and need not be described here in detail. The material to be separated enters the tank 10 by chute 21. The lower conveyor 11 as well as the upper one 12 are mounted in the tank 10 so that their lower portions are immersed in the separation fluid. As will be appreciated by the skilled artisan, bearings 22, 23 and 24 support the lower conveyor 11 for rotary movement by power transmitted through gear 25 mounted on the shaft 26 of the lower conveyor 11. The semi-circular drainage sieve or trough 13 is mounted in the tank immediately below the lower conveyor 11 with a metal to metal operating contact between the outside edge of the conveyor 11 and the inside surface of the drainage sieve as indicated in Fig. 5. The trough or drainage sieve 13 consists of a plurality of bars 30 (Fig. 5) having a rectangular cross section and a plurality of short wedge shaped spacers 31 interposed at intervals between the bars and held in assembly by means of metal U-shaped supporting members 32 whose ends are extended upward and suitably mounted on the sides 20 of the tank 10. The U-shaped supporting members 32 at each end of the sieve or trough are welded or soldered to the bars 30 and spacers 31 to effect a permanent assembly thereof. Longitudinally extending aprons 33 suitably mounted on the supporting members 32 serve to avoid the backing up of material along the upper edges of the sieves 13 and 14.

The wedge shaped spacers are relatively short in length and are positioned intermittently along the length of the trough and may be located in the area of and supported by the strap-members 32 as shown in Fig. 5, so as to leave a maximum of opening between the bars 30 for the passage of material therethrough. The function of the wedge shaped spacers 31 is to properly position the bars 30 to provide narrow slit-like openings between the bars 30 which increase in size toward the bottom surface of the trough. The wedge shaped spacers 31 are so designed that the spacer bars 30 are separated at their top edges by a distance of about .02 of an inch. Thus by this construction a drainage trough or sieve is provided with openings which gradually increase in size, the openings being smallest at the inner surface of the trough and largest at the outer surface of the trough. It has been found in practice that a drainage sieve so constructed is self-clearing

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and the openings do not become blinded by drainage matter.

The upper conveyor 12 is shorter but otherwise similar to the lower conveyor 11 and is rotatably supported in the tank 10 by bearings 35, 36 and 37. As will be understood by those skilled in the art, power is transmitted for rotating the conveyor 12 through the gear 40 mounted on shaft 41. The drainage sieve 14 is mounted immediately underneath conveyor 12 with a metal to metal operating contact and is constructed the same as drainage sieve 13 except that a portion is cut out at 42 as shown in Figs. 1, 2 and 3, in order to allow the heavier material to sink through the separation fluid into the sieve 13. Discharge chutes 45 and 46 are provided to receive materials from the upper and lower conveyors. Sprays 47 are provided for cleaning the separated materials, and pressure inlets 48 are provided for agitating the separating fluid as will be well understood by the art.

Thus my invention provides an efficient self clearing and non-blinding drainage sieve or screen which is simple and inexpensive to construct. Rectangular bars are standard and relatively easy to obtain, and the short wedge shaped spacers may be made easily and economically. This drainage screen or sieve is here shown as used in a particular form of apparatus for separating materials, but it will be clear to those skilled in the art that the screen or sieve may be used advantageously for removing any small sized material from a heterogeneous mixture of sizes. The screen or sieve functions more effectively when the material to be separated is fed to the screen accompanied by wash water or its equivalent. Thus various changes and modifications may be made in the preferred and illustrative form of my invention as described above without departing from the spirit thereof as hereinafter claimed.

I claim:

1. In an apparatus for separating materials including a conveyor means for progressing materials being separated, a drainage screen positioned under said conveyor means in operative contact therewith, said drainage screen having in the inner surface thereof narrow longitudinal slot-like openings which widen toward the outer surface of the drainage screen.

2. The invention of claim 1 characterized fur-

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ther by the fact that said drainage screen comprises a plurality of bars of rectangular cross-section, a plurality of short wedge shaped spacers interposed between said bars, a plurality of U-shaped members for supporting said bars and spacers in permanent assembly.

3. In an apparatus for separating heterogeneous materials of differing specific gravities, a rotary conveyor means, a plurality of bars of rectangular cross section positioned radially around the bottom portion of said conveyor means in operative contact therewith to form outwardly extending diverging openings between said bars, a plurality of short wedge-shaped spacers between said bars and a plurality of narrow U-shaped members supporting said bars and said wedge-shaped spacers in permanent assembly as a concave trough.

4. In an apparatus for separating heterogeneous materials of differing specific gravities, a drainage screen formed with an arcuate cross-sectional shape and having formed therein narrow longitudinal slot-like openings which widen toward the outer surface of the drainage screen, and a screw conveyor means having a radius substantially the same as the arc of the cross-section of said screen, said screw conveyor being positioned in said screen in operative contact therewith whereby materials lodged in said slot-like openings in said screen may be progressively subject to longitudinal clearance action of the screw conveyor and from other material being moved along said slot-like openings.

MARCUS A. WALKER.

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The following references are of record in the file of this patent:

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Certificate of Correction

Patent No. 2,491,912

December 20, 1949

MARCUS A. WALKER

It is hereby certified that errors appear in the above numbered patent requiring correction as follows:

In the grant, line 3, address of inventor, for "Lackawanna, Pennsylvania" read *Scranton, Pennsylvania*; in the heading to the printed specification, line 3, for "Lackawanna, Pa." read *Scranton, Pa.*; and in the printed specification, column 2, line 38, for the word "rough" read *trough*;

and that the said Letters Patent should be read with these corrections therein that the same may conform to the record of the case in the Patent Office.

Signed and sealed this 23rd day of May, A. D. 1950.

[SEAL]

THOMAS F. MURPHY,
Assistant Commissioner of Patents.