Dec. 14, 1926. 1,610,716

A. H. STEBBINS

SCREEN SEPARATOR

Filed Feb. 9, 1926 2 Sheets-Sheet 1

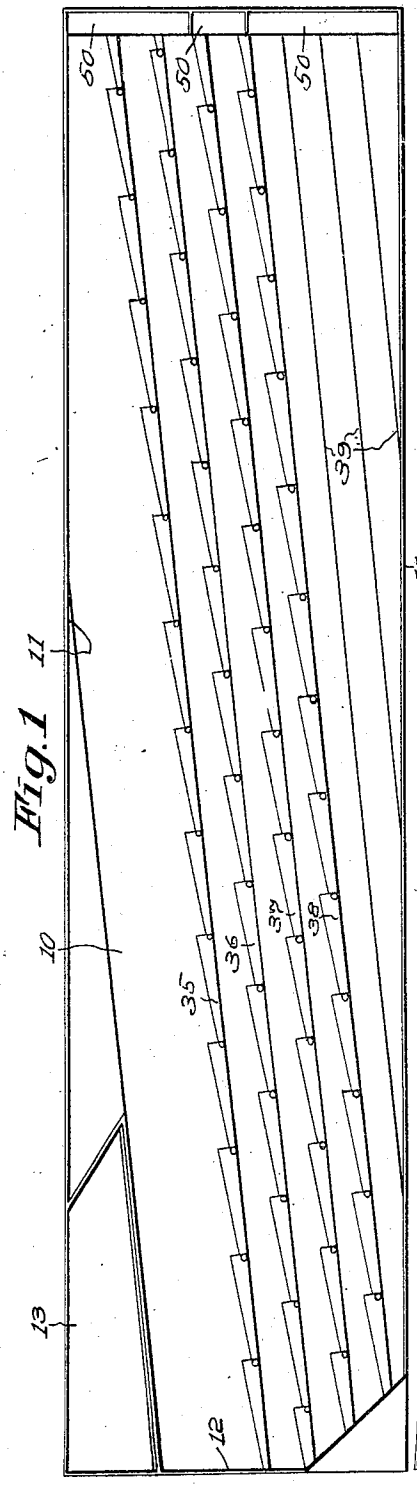


Fig. 1

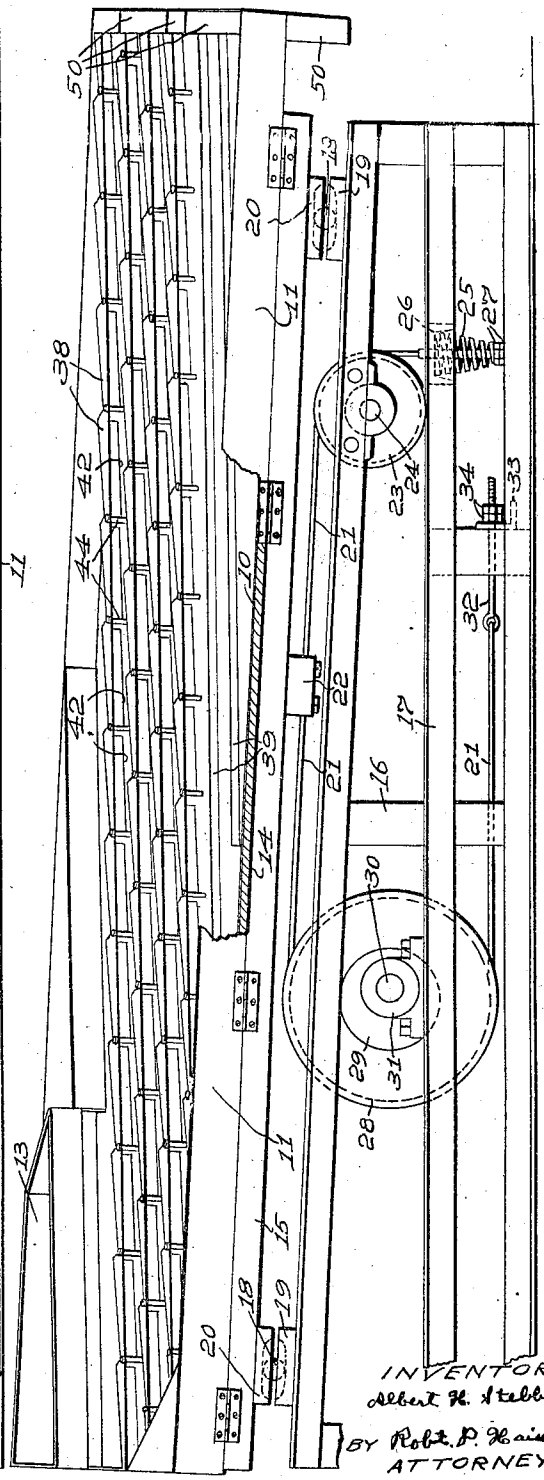


Fig. 2

INVENTOR
Albert H. Stebbins
BY Robt. P. Haines
ATTORNEY

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Filed Feb. 9. 1926 2 Sheets-Sheet 2

Fig.3

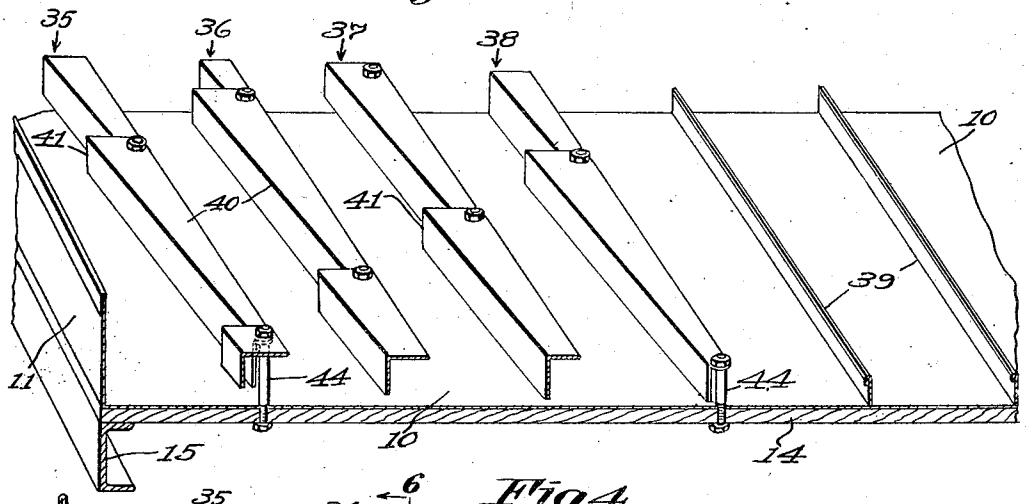


Fig.4

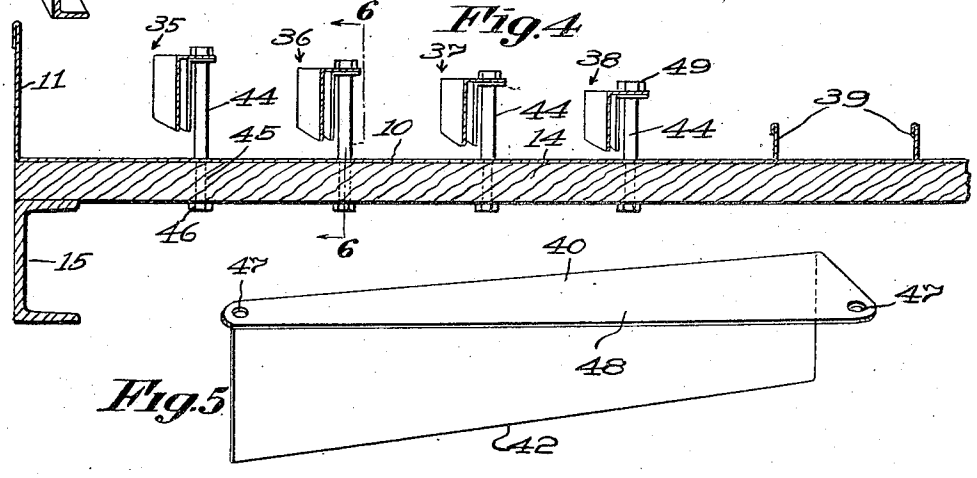


Fig.5

Fig.6

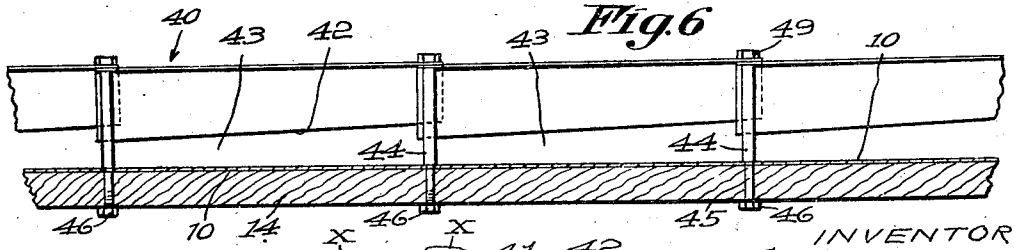
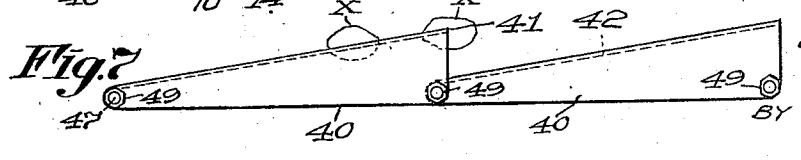


Fig.7



INVENTOR
Albert H. Stebbins
BY Robt. P. Haines
ATTORNEY

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UNITED STATES PATENT OFFICE.

ALBERT H. STEBBINS, OF LOS ANGELES, CALIFORNIA.

SCREEN SEPARATOR.

Application filed February 9, 1926. Serial No. 87,023.

This invention relates to a novel form of separator employing one or more skimmers supported in spaced relation to a material supporting surface to direct the coarse materials away from the fine materials.

Skimmers have been employed heretofore in separating materials to skim off or remove the upper strata of the materials being treated, and as heretofore constructed consist of sheets or aprons mounted in spaced relation to the main material supporting surface. These skimmers as employed heretofore serve to remove the light upper strata of materials irrespective of the size of the different particles removed.

The skimmers employed in accordance with the present invention differ from those used heretofore, in that the present skimmers serve to separate the large particles from the small particles and are not employed to remove the light upper strata as heretofore.

One important feature of the present invention resides in a material supporting surface or deck that is mounted at a transverse inclination, and has one or more skimmers supported in spaced relation to the deck surface and arranged so that the coarse particles are directed lengthwise of the deck while the fine particles flow laterally of the deck under the skimmers.

Another important feature of the invention resides in a skimmer formed of skimmer sections arranged in overlapping relation to each other so that the large particles that lodge under the edge of one section will be directed away from the edge of the next section.

Another important feature of the invention resides in a skimmer the lower edge of which is formed of successive portions that are inclined to the material supporting surface to reduce the tendency of the large particles to lodge in the slot or opening below the skimmer.

Other features of the invention and novel combination of parts in addition to the above will be hereinafter described in connection with the accompanying drawings which illustrate one good, practical form of the invention.

In the drawings,—

Fig. 1 is a plan view of a casing or deck provided with skimmers constructed and arranged in accordance with the present invention;

Fig. 2 is a side view of the casing of Fig. 1, shown mounted upon a supporting frame and a portion of the casing being broken away to show the skimmers.

Fig. 3 is a perspective sectional view taken transversely of the casing of Fig. 1;

Fig. 4 is a transverse sectional view of Fig. 1;

Fig. 5 is perspective view of one of the skimmer sections to be described;

Fig. 6 is a longitudinal sectional view taken on the line 6—6 of Fig. 4; and

Fig. 7 is a plan view looking down upon a pair of overlapping sections of a skimmer.

The casing in which the separation of the materials is effected may be variously constructed and is shown as rectangular in configuration and as having a length that is considerably greater than its width. The floor 10 of this casing constitutes a deck or material supporting surface and is preferably formed of sheet-metal. The casing may have the side walls 11, and is provided with the end wall 12 at the left-hand end of the casing, viewing Figs. 1 and 2. In the construction shown the materials to be treated are delivered to the deck surface 10 by a hopper 13 mounted at the upper left-hand end of the casing. The deck surface 10 of the casing may rest upon the relatively thick floor 14 to which the longitudinally extending beams 15 are secured.

The deck surface 10 is preferably supported at a transverse inclination, as shown in Fig. 2, to promote travel of the materials transversely of the deck surface, but this transverse inclination of the deck surface is not essential in all embodiments of the invention, since a vibratory movement in a transverse direction may be employed to produce the transverse flow.

The casing shown in Fig. 1 is preferably mounted for vibratory movement in the direction of its length and one satisfactory means for supporting the casing for back and forth movement in the direction of its length is shown in Fig. 2 and comprises a supporting frame having the uprights 16 to which the longitudinally extending rails 17 are secured, and the means shown for mounting the casing upon its frame for back and forth movement consists of balls or rollers

18 mounted in bearing blocks 19 secured to the supporting frame. The upper portion of the balls or rollers 18 may extend into bearing blocks 20 secured to the side rails 15 of the material supporting casing.

The material supporting casing may be supported either horizontally in the direction of its length, or may be given a downward slope from its material receiving end towards its discharge end, as shown in (Fig. 2, and in some cases it may be desirable to give the material supporting casing an uphill slope in the direction of its length. In the construction shown it should be noted that the supporting frame is higher at its left-hand end than at its right-hand end to support the casing at an inclination in the direction of its length to promote travel of the materials lengthwise thereof towards the discharge end of the casing.

Various means might be provided for imparting a back and forth or vibratory movement of the casing, and this movement may be either a simple back and forth movement, or it may be a progressive movement, as desired. If the casing is supported horizontally in the direction of its length or is given an uphill slope in the direction of its length, a progressive movement will of course be necessary to advance the materials lengthwise thereof, while if the casing slopes downwardly towards its discharge end as shown in Fig. 2, a simple back and forth movement may suffice to advance the materials along the same. The means shown for imparting a vibratory movement to the casing consists of a cable 21, an intermediate portion of which is rigidly secured to the casing as at 22. One portion of this cable extends in a right-hand direction from the securing means 22 and is bent around a grooved sheave 23 supported by the transversely extending shaft 24 mounted upon the supporting frame. The portion of this cable extending downwardly from the sheave 23 is yieldingly secured to the supporting frame by any suitable means such as the coiled spring 25, the upper end of which spring rests against a transversely extending beam 26 while the lower end of this spring is supported by nuts 27 adjustably secured to the lower end of the cable 21.

The portion of the cable 21 that extends in a left-hand direction from the securing means 22 passes around a grooved sheave 28 which is mounted upon an eccentric 29, this eccentric being secured to or formed integral with the driving shaft 30 supported by the bearing blocks 31 mounted upon the supporting frame. The portion of the cable extending from the lower side of the sheave 28 is anchored to the supporting frame by any suitable means such as a bolt 32 that passes through an opening in the transversely extending beam 33 of the casing and is adjustably secured to the beam 33 by the nuts 34. The arrangement is such that as the eccentric 29 is rotated within the sheave 28 it will move the sheave back and forth to tension and slack off the portion of the cable 21 engaging the same; that is, the sheave 28 will tension the cable 21 to pull the material supporting casing in a left-hand direction and will then slack off this portion of the cable to permit the casing to be pulled in a right-hand direction by the compressed spring 25, thus moving the casing back and forth to vibrate the same.

As stated, one important feature of the present invention resides in the construction and arrangement of the skimmer whereby the coarse materials are separated from the fine materials, and one good practical form of skimmers will now be described. If it is desired to effect only one separation of the materials, then a single skimmer 35 extending lengthwise of the deck may suffice, but if it is desired to separate the materials into a number of different grades, then a plurality of skimmers such as 35, 36, 37 and 38 should be provided, as shown in Fig. 1, and which are supported different distances from the deck surface to vary the size of the opening formed between the lower edge of each skimmer and the deck surface. However, if only a single separation of the materials is desired it may still be desirable to employ several skimmers, as the skimmers with the larger openings will serve as scalpers to help relieve the work of the other skimmers.

In the particular construction illustrated the skimmers 35, 36, 37 and 38 are shown as extending in an inclined direction lengthwise of the casing, this being desirable as it helps force the finer materials under the skimmers, and it also affords a relatively wide space at the upper left-hand side of the casing to accommodate the hopper 13. This inclined arrangement of the skimmers has the further advantage in that it provides a space at the lower side of the casing which increases in width towards the discharge end of the casing, and in which space the riffles 39 may be provided.

The arrangement of the skimmers is such that the first skimmer 35 is spaced the greatest distance from the deck surface 10, as best shown in Fig. 4, and this skimmer will serve to remove only the largest materials. The second skimmer 36 is disposed somewhat closer to the deck surface and will serve to remove the next size materials, while the other skimmers 37 and 38 are disposed still closer to the deck surface to remove still smaller materials. It will be understood that the transverse inclination of the deck surface 10 in combination with the vibratory movement imparted to the

same, will cause the finer particles to sift under the successive skimmers, while the coarser particles, which are too large to pass under a particular skimmer, will travel along a skimmer until it is discharged from the right-hand end thereof by the deck movement. The coarse materials which travel along a particular skimmer to the discharge end thereof may be discharged in a separate hopper, or the materials supplied by two or more skimmers may be directed into the same hopper, as desired. The riffles 39 extending along the lower side of the casing will serve to prevent all the fine materials which escape from under the various skimmers from piling up against the lower side wall 11 of the casing, and will serve also to further separate or classify the fine materials.

It is important that the construction of the skimmers be such that large particles be prevented from becoming wedged under a skimmer, to thereby arrest the proper flow of the materials lengthwise of that skimmer, and in accordance with the present invention this is accomplished by forming each skimmer of a number of skimmer sections 40 (see Fig. 5), and these skimmer sections 40 are arranged in overlapping relation to each other, as best shown in Figs. 3 and 6. The arrangement is such that the right-hand end of one skimmer section 40 overlaps the left-hand end of the next skimmer section and is spaced laterally a substantial distance therefrom, as indicated by 41 in Figs. 3 and 7. As a result of this construction the coarse particles indicated by x in Fig. 7 which fail to pass under the lower edge of a particular skimmer, but which slide along the same in the slot formed between the lower edge of the skimmer and the deck surface, will be directed away from the edge of the next skimmer section, as will be apparent from Fig. 7. It will therefore be seen that this overlapping construction of the skimmer sections serves in a very satisfactory manner to prevent the large particles from remaining in the slot below a skimmer throughout the entire length of the skimmer.

Another feature of the present invention for preventing large particles from becoming wedged under the edge of a skimmer resides in the construction whereby the lower edge 42 of each skimmer section 40 is disposed at an inclination to the deck surface 10 so that it inclines upwardly in the direction of its length, as best shown in Fig. 6. It will therefore be seen that the slot or opening 43 formed between the lower edge of a skimmer section and the deck surface increases in width in the direction in which the materials travel along the same, thus materially reducing the tendency of particles becoming wedged in the slot or opening 43. Various means might be provided for supporting the skimmer sections 40 in spaced relation to the deck surface, and in the construction shown this is accomplished by providing the posts 44 the lower end portions of which may be reduced in diameter as at 45 so that they will extend through openings formed in the deck surface 10 and in the floor 14, and these posts may be rigidly secured in an upright position by tightening the nuts 46 having threaded engagement with the lower end of each post. The upper end of each post preferably has a reduced end portion adapted to extend through the holes 47 formed near the opposite ends of the laterally extending portion 48 of each skimmer section 40. The arrangement is such that the opposite ends of two adjacent skimmer sections 40 are secured to a single post in overlapping relation by tightening the nut 49 at the upper end of the post. The height at which any particular skimmer is supported from the deck surface 10 may be varied as desired by varying the height of the posts 44, as will be apparent from Fig. 4.

From the foregoing description, when read in connection with the drawings, it will be seen that the deck surface 10 may be provided with as many skimmers as desired, each of which may be spaced at different distance from the deck surface to separate out a different grade of materials, and that by forming each skimmer of a number of sections 40 having an inclined lower edge and the spaced overlapping construction described, all danger of particles becoming wedged under a skimmer is avoided. It will therefore be seen that the screen separator of the present invention will operate in an extremely satisfactory manner to separate materials into a number of different grades, and to deliver the same into the discharge hoppers 50, while all danger of the screening slots or openings 43 becoming clogged is avoided.

What is claimed is:—

1. A device for separating materials, comprising in combination, a casing having a deck surface supported at a transverse inclination, skimmers extending lengthwise of the casing and supported in spaced relation to the deck surface to form openings between the lower edge of the skimmers and said surface through which the finer materials may escape by flowing laterally of the inclined deck surface, and means for vibrating the casing to advance the materials over the deck surface and to facilitate the working of the materials under the skimmers.

2. A device for separating materials, comprising in combination, a casing having a deck surface supported at a transverse inclination, a skimmer supported in spaced

relation to the deck surface and extending longitudinally thereof to direct the coarse materials lengthwise of the deck while permitting the fine materials to escape under the lower edge of the skimmer under the influence of the lateral inclination of the deck surface, and means for vibrating the casing to advance the materials over the deck surface and to facilitate the working of the materials under the skimmer.

3. A device for separating materials, comprising in combination, a casing having a deck surface supported at a transverse inclination, rows of skimmers supported in spaced relation to the deck surface and extending longitudinally thereof to direct the coarse materials along the skimmers lengthwise of the deck while permitting the fine materials to escape under the lower edge of the skimmers under the influence of the lateral inclination of the deck surface, and means for vibrating the deck surface to promote travel of the materials thereupon and to facilitate the working of the materials under the skimmers.

4. A device for separating materials, comprising in combination, a casing having a deck surface supported at a transverse inclination, rows of skimmers extending lengthwise of the deck surface to direct the coarser materials along the skimmers, means for supporting the skimmers of the rows at successively decreasing distances from the deck surface, so that as the finer materials flow laterally of the deck surface beneath the skimmers under the influence of the lateral inclination of the deck each skimmer row will remove a different grade of materials, and means for vibrating the deck surface to promote travel of the materials thereupon and to facilitate the working of the materials under the skimmers.

5. A device for separating materials, comprising in combination, a casing having a floor that is rigidly secured to the framework of the casing to form a non-flexible deck surface, a skimmer supported in spaced relation to the deck surface and having a material directing wall extending longitudinally of the deck surface to direct the coarse materials along the skimmer while permitting the fine materials to escape laterally under the skimmer, and means for vibrating the casing to advance the materials over the deck surface and to facilitate the working of the materials under the skimmer.

6. A device of the class described, comprising in combination, a casing having a deck surface, a skimmer supported in spaced relation to the deck surface and formed of skimmer sections the lower edges of which are inclined to the deck surface to form tapered clearance spaces between the deck and skimmer through which the finer materials may escape while the coarse materials travel along the skimmer, and means for vibrating the casing to promote travel of the materials upon the deck surface.

7. A device of the class described, comprising in combination, a casing having a deck surface, a skimmer supported in spaced relation to the deck surface and formed of upstanding skimmer sections arranged in spaced overlapping relation to each other so that the larger materials that become lodged beneath the edge of a skimmer section are released upon reaching the end of that section, and means for vibrating the casing to promote travel of the coarse materials along the skimmer and passage of the fine materials under the skimmer.

8. A device of the class described, comprising in combination, a casing having a deck surface, a skimmer supported in spaced relation to the deck surface and formed of upstanding skimmer sections arranged in overlapping relation so that the upstanding end portion of one section is spaced laterally from the section it overlaps to direct the coarse materials laterally away from the end of the next section, and means for vibrating the casing to promote travel of the coarse materials along the skimmer and passage of the fine materials under the skimmer.

9. A device of the class described, comprising in combination, a casing having a deck surface, a skimmer supported in spaced relation to the deck surface and formed of upstanding skimmer sections arranged in laterally spaced overlapping relation and having their lower edges inclined to the deck surface to form tapered openings through which the fine materials may escape, and means for vibrating the casing to promote travel of the coarse materials along the skimmer and passage of the fine materials under the skimmer.

10. A device for separating materials, comprising in combination, a casing having a floor that is rigidly secured to the framework of the casing to form a non-flexible deck surface, a row of skimmers extending in an inclined direction over the deck surface and each having a material directing wall supported in spaced relation to the deck surface, means for supporting the deck surface at an inclination to promote flow of the finer materials beneath the skimmers under the influence of gravity, and means for vibrating the deck surface to promote travel of the coarse materials along the skimmers and to facilitate working of the finer materials under the skimmers.

11. A device for separating materials, comprising in combination, a casing having a deck surface the length of which is greater than its width and which is supported at a transverse inclination, a series of skimmers extending over the deck surface at a slight inclination to the length of the deck so that

they slope upwardly toward the upper side of the deck as they approach the delivery end of the deck, means for supporting the skimmers in spaced relation to the deck surface, and means for vibrating the casing to promote travel of the materials along the deck surface so that the coarse materials are directed lengthwise of the deck surface toward the upper side of the casing while the fine materials escape under the skimmers.

12. A device for separating materials, comprising in combination, a casing having a deck surface, a skimmer extending over the deck surface and having a downwardly extending wall, posts secured to and extending upwardly from the deck surface to support the skimmer with the lower edge of said wall in spaced relation to the deck surface, and means for vibrating the deck surface to advance the coarse materials along the skimmer wall while the fine materials escape under the skimmer.

In testimony whereof, I have signed my name to this specification.

ALBERT H. STEBBINS.