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METHOD OF AND APPARATUS FOR SCREENING MATERIALS.

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1,332,685.

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Fig. 2.

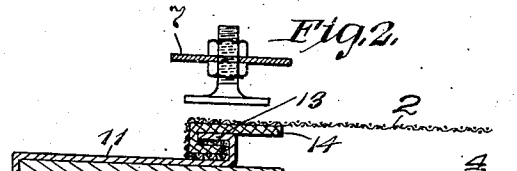


Fig. 4.

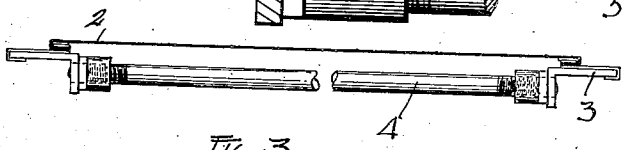


FIG. 3

FIG. 1

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METHOD OF AND APPARATUS FOR SCREENING MATERIALS.

1,332,685. Specification of Letters Patent. **Patented Mar. 2, 1920.**

Application filed October 15, 1917. Serial No. 196,562.

To all whom it may concern:

Be it known that I, MORLEY PUNSHON REYNOLDS, a citizen of the United States, and a resident of Cleveland Heights, county of Cuyahoga, and State of Ohio, have invented a new and useful Improvement in Methods of and Apparatus for Screening Materials, of which the following is a specification, the principle of the invention being herein explained and the best mode in which I have contemplated applying that principle, so as to distinguish it from other inventions.

The present invention, relating as indicated to a method of screening materials, is particularly directed to an improved method of separating or grading material of various sizes more closely and rapidly than by previous methods and with less wear on the screening surface. To the accomplishment of the foregoing and related ends, said invention, then, consists of the means hereinafter fully described and particularly pointed out in the claims.

The annexed drawings and the following decription set forth in detail one approved method of carrying out the invention, such disclosed mode, however, constituting but one of the various ways in which the principle of the invention may be used.

In said annexed drawings:—

Figure 1 is a side elevation of one form of apparatus which may be used to carry out my improved method; Fig. 2 is a sectional view of one of the hammers; Fig. 3 is a transverse section through the screen and frame; and Fig. 4 is an enlarged view showing one approved means of attachment of the screen to the frame.

In screening materials it has been customary to screen them through a screen surface held to the sides of the frame by riveting, bolting or tacking. Springs also have been used in an endeavor to hold the screen surface taut, although without success. The screen is then shaken or struck to cause the material to move thereon. I have developed an improved method of screening which has been found very much more efficient, both in speed and separation than any previous methods operated on the above-named lines.

My improved method, briefly stated, consists in passing screenable material of various sizes onto a woven wire screening surface tautened to a vibratory, drumhead tension, and then imparting to such screen a series of impulses of sufficient intensity to cause the material to move over the screen surface but without leaving the surface. That is, the intensity of the vibrations is so proportioned to the nature of the material, that the screen is vibrated sufficiently to move the material in an agitated way over it but without such a movement as to interfere with the screening action. I have found that an extremely rapid and accurate separation can be secured in this way, the screen surface being maintained at a high drumhead tension and being vibrated by impulses of an intensity proportioned to the condition of the material.

Referring now to the drawings, there is shown suitable frame or casing 1 supported at an incline and containing a screen 2 mounted between frame members 3 which may be adjusted toward and away from each other to increase or decrease the tension on the screen. This adjustment may conveniently be made by rods 4 having right and left hand threaded engagement with the side members 3 as shown in Fig. 3. The tensioning of the screen cloth must be uniform and every wire of one series, that is, either the longitudinal or the transverse wires, must be tensioned equally so that the screen as a whole is given a vibratory, drumhead tension. This uniform tension may be secured by means of the engagement shown in section in Fig. 3, in which the screen is gripped at all points along its edge, by means of the reinforcing and attaching member 11 formed at the edge into a hook 12 for engagement over the edge of the frame side bar 3. At the inner edge, the member 11 is formed into a second hook 13 and is crimped over the edge of the screen cloth with the assistance of an insertion strip 14 of a suitable fabric such as cotton webbing or the like.

Material is supplied to the screen by a feeding device 5 of any suitable type, mounted to feed a screenable layer of material onto the upper end of the inclined screen 2.

It is essential that the screen be caused to vibrate rapidly and yet not enough to keep the material in the air sufficiently to interfere with the screening action and therefore I provide convenient means for proportioning the vibratory impulses to the material. One such means consists of hammers 6

mounted at the ends of springs 7 and adapted to strike impact posts 8 attached to the screen in any desired manner. Cams 9 cause the springs 7 to be flexed and then released so that the hammers strike the posts a sharp blow, the intensity of which can be varied by adjusting the hammer-head 10 in the ends of the springs by reason of the threaded engagement between the two (see Fig. 2).

In carrying out my improved method by the means, which for convenience and clearness of illustration, I have here shown a layer of material fed onto the upper end of the screen. The latter is then vibrated at a rapid rate by blows from the hammers 6, the hammers being set to actuate the screen to move the material over it but without such movement away from it as to interfere with the screening action. The material in fact, may be said to move down the screen, hugging the surface of it all the way and in intermittent contact therewith, although the screen is vibrated sufficiently to keep the material in continual motion and agitation, so that a maximum number of particles are presented to the meshes of the screen for each unit of movement, thereby obtaining the maximum sorting action. To secure the best results it is essential that the individual wires in the screen be tightened uniformly to the same degree of tension, so that the screen surface as a whole acts as a drumhead under each blow of the hammers.

The intensity of the blows of the hammers must be proportioned to the material since I find that coarse or heavy material requires a greater intensity of blow to move it over the screen than light or fine material.

It is equally essential in securing the desired results that a uniform tension on all wires be maintained and in the form of apparatus illustrated I have shown a convenient adjustment of the maintenance of this tension in Fig. 3, in which the edge of the screen is brought over a snubbing member and clamped, thus snubbing each wire. The individual wires are thus placed under uniform tension which may be increased to the necessary drumhead tension by adjustment of the rod 4.

My improved method of screening has been found to afford a very accurate and extremely rapid separation, due to the drumhead tension of the wire screen and to the continuous movement of the screen and material in contact with it. The material is not caused to leave the screen surface appreciably, but is moved over it and rapidly vibrating to present the maximum number of particles to the meshes of the screen. Since the screen is under high tension all parts of the screen must lie in the same plane, and an even distribution of material over the surface of the screen will be maintained with the result that the wear given the screen surface will be even and uniform, and the entire screen surface in effective action at all times.

Other modes of applying the principle of my invention may be employed instead of the one explained, change being made as regards the process herein disclosed, provided the step or steps stated by any one of the following claims or the equivalent of such stated step or steps be employed.

I therefore particularly point out and distinctly claim as my invention:—

1. In a method of grading materials of various sizes, the steps which consist in passing a screenable layer of such material over the entire width of an inherently resilient woven wire screen uniformly and uninterruptedly held edgewise and mounted to be freely vibratory throughout its entire screening area and fixed at a positive uniform tension throughout such area, and simultaneously vibrating such screen while under such fixed tension.

2. In a method of grading material of various sizes, the steps which consist in passing a screenable layer of such material over an inherently resilient woven wire screen uniformly and uninterruptedly held edgewise and fixed at a uniform drumhead tension, simultaneously vibrating such screen while under such fixed tension, and positively and constantly maintaining such tension on said screen.

3. In a method of screening materials of various sizes, the steps which consist in passing a screenable layer of such material over the entire width of an inherently resilient woven wire screen tensioned uniformly and uninterruptedly along opposite external edges to a freely vibratory condition throughout its entire width, and fixed at a positive uniform tension throughout such area and simultaneously vibrating such screen while under such fixed tension.

4. In a method of grading materials of various sizes, the steps which consist in passing a screenable layer of such material over the entire width of an uninterrupted inherently resilient woven wire screen held uniformly and uninterruptedly at opposite external edges and tensioned along such edges to be freely vibratory throughout its entire and uninterrupted screening area, and fixed at a positive uniform drumhead tension throughout such area, simultaneously imparting to such screen while under such fixed tension a series of impulses of sufficient intensity to cause such material to move over the entire uninterrupted surface of said screen.

5. In an apparatus of the character described, the combination of an inclined inherently resilient woven wire screen, means along opposite external edges thereof to hold the same uniformly and uninterruptedly in

a freely vibratory condition throughout its entire screening area and to fix the same at a positive uniform tension throughout such area, the tension being applied in line with the meshes of the screen, and means adapted to vibrate such screen while under such tension.

6. In an apparatus of the character described, the combination of an inclined inherently resilient screen uninterrupted throughout its width, means along opposite external edges thereof, said means being adapted to hold said screen uniformly and uninterruptedly along such edges and to tension said screen from such edges to a freely vibratory condition throughout its entire screening area and to fix the same at a positive uniform tension throughout such area, and means adapted to vibrate such screen while under such tension.

7. In an apparatus of the character described, the combination of an inclined inherently resilient screen uninterrupted throughout its width, means along opposite external edges thereof, said means being adapted to uniformly grip all the transverse wires of such screen and to tension the same to a freely vibratory condition throughout its entire screening area, and means adapted to vibrate such screen while under such tension.

8. In an apparatus of the character described, the combination of an inclined inherently resilient screen uninterrupted throughout its width, means along opposite external edges thereof, said means being adapted to uniformly grip all of the transverse wires of such screen and to tension the same to a freely vibratory condition throughout its entire screening area, said means being adapted to positively and constantly maintain such transverse wires under such uniform tension, and means adapted to vibrate such screen while under such tension.

9. In an apparatus of the character described, the combination of an inclined inherently resilient screen uninterrupted throughout its width, means adapted to uniformly grip all of the transverse wires of such screen along opposite external edges thereof, tensioning means adapted to actuate said wire gripping means to tension such screen uniformly to a freely vibratory tension throughout its entire screening area, said means being also adapted to re-tension such screen at intervals during use to maintain the same at such vibratory tension, and means adapted to vibrate such screen while under such tension.

Signed by me, this 13th day of October, 1917.

MORLEY PUNSHON REYNOLDS.