July 1, 1924.

1,499,892

T. J. STURTEVANT ET AL

SEPARATOR

Filed April 5, 1923

3 Sheets-Sheet 1

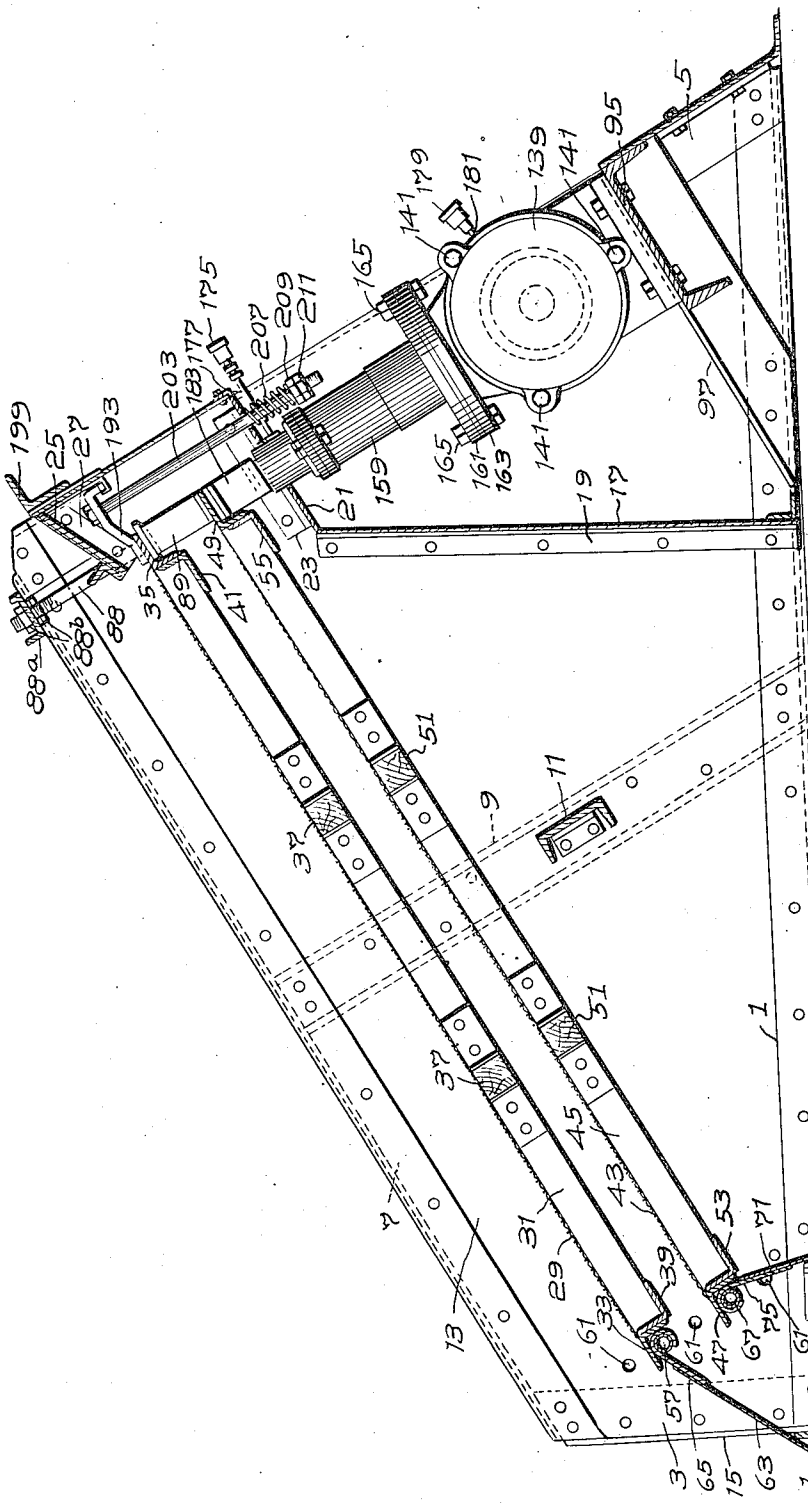


Fig. 1

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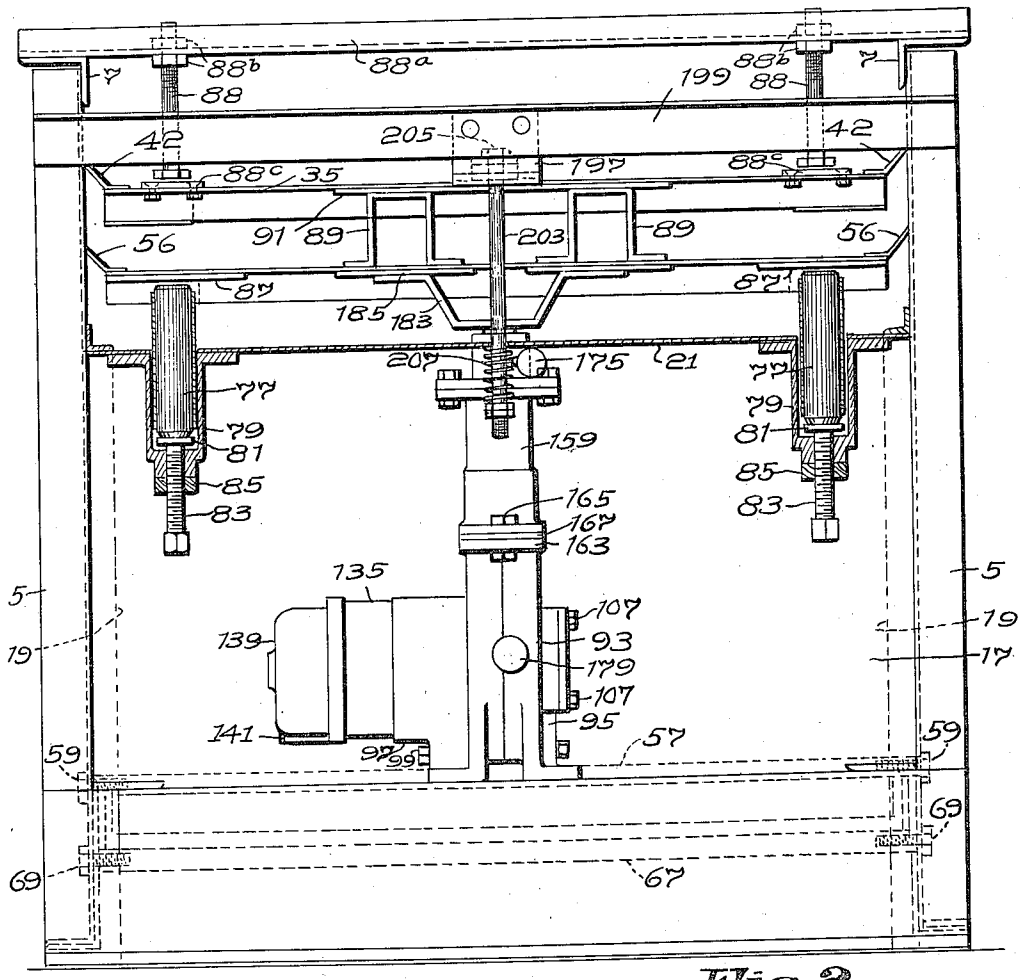


Fig. 2

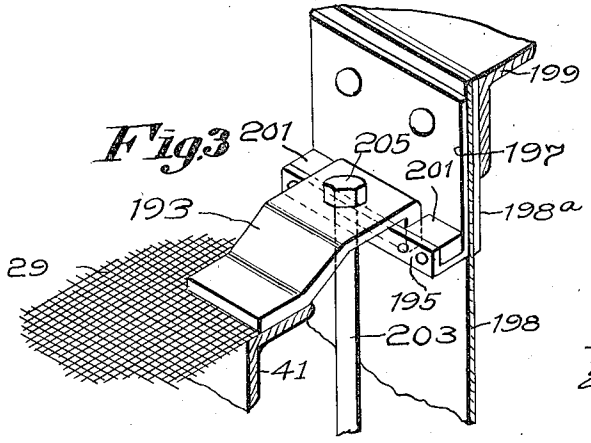


Fig. 3

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Filed April 5, 1923 3 Sheets-Sheet 3

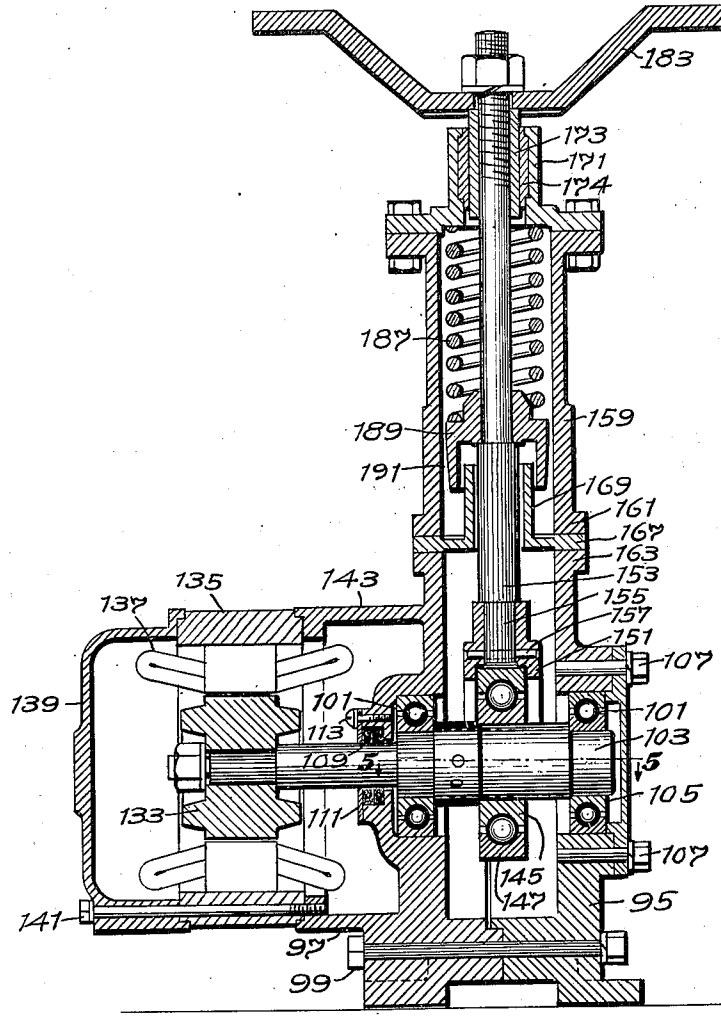


Fig.4

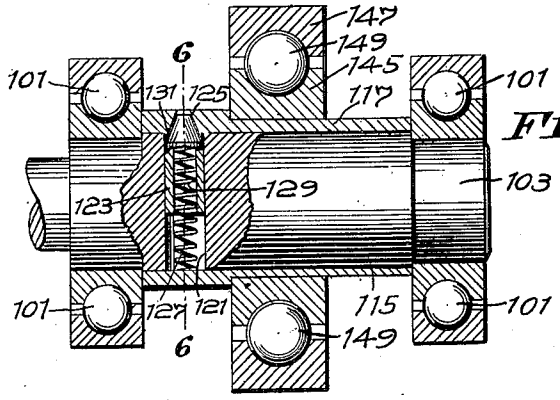


Fig.5

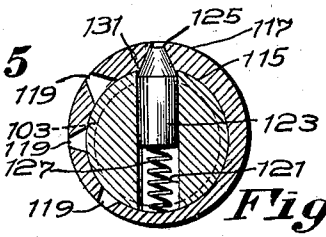


Fig.6

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Patented July 1, 1924. 1,499,892

UNITED STATES PATENT OFFICE.

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SEPARATOR.

Application filed April 5, 1923. Serial No. 630,038.

To all whom it may concern:

Be it known that we, THOMAS J. STURTEVANT and EDWARD A. SAWYER, citizens of the United States, residing at Wellesley and Swampscott, respectively, in the counties of Norfolk and Essex, respectively, and State of Massachusetts, have invented certain new and useful Improvements in Separators, of which the following is a specification.

The invention to be hereinafter described relates to screen separators for grading materials, and more particularly to means for vibrating the screen or screens.

In Letters Patent of T. J. Sturtevant, No. 1,454,140, granted May 8, 1923, is disclosed an eccentric mechanism for vibrating the screen. The eccentric has slight eccentricity, and it is rotated at high speed, and means is provided for transmitting movements from the eccentric to the screen, thereby to place the same in a highly vibrant condition. The transmitting means preferably is not attached to the screen, so that the latter may move independently thereof with sympathetic vibrations.

The mechanism of said patent is a good efficient means for the purpose, but under some conditions it is desirable to provide means which may cooperate with the eccentric vibrating mechanism further to contribute to the vibration of the screen.

In carrying this feature of the invention into practical effect, in the present instance, the eccentric mechanism vibrates a member of the resilient screen frame, causing end portions of the member to flex and whip up and down against elements which limit the amplitude of vibration of the end portions of the frame member, and desirably cooperate with the eccentric mechanism in producing effective vibration of the screen.

The eccentric preferably has slight eccentricity, but under different conditions it may be desirable to vary this slight eccentricity, thereby to vary the amplitude of the blows or reciprocatory movements which the eccentric mechanism imparts to the screen. Another purpose of the invention, therefore, is to provide a strong, simple device whereby the eccentricity or effective throw of the eccentric may be readily varied as required.

With the aforesaid and other purposes in view, the character of the invention may be best understood by reference to the following description of one good form thereof shown in the accompanying drawings, wherein:

Fig. 1 is a vertical longitudinal section through a separator embodying the invention;

Fig. 2 is a rear elevation of the separator shown in Fig. 1, certain parts being shown in section;

Fig. 3 on an enlarged scale is a perspective view of a detail to be referred to;

Fig. 4 on an enlarged scale is a vertical section through the eccentric vibrating mechanism;

Fig. 5 on an enlarged scale is a section taken on line 5—5 of Fig. 4; and

Fig. 6 is a transverse section taken on line 6—6 of Fig. 5.

Referring to the drawings, the separator shown therein as one good form of the invention, may comprise a frame, casing, or other suitable support, in the present instance, including base angle bars 1, front upright angle bars 3, rear inclined angle bars 5, and top inclined angle bars 7, the ends of said bars being overlapped and riveted or otherwise secured together. To further contribute to the strength of the construction, the base bars 1 and top bars 7 may be connected to inclined channels 9 which may be stiffened by a cross channel 11. In the present instance of the invention, the sides of the separator are closed by side plates 13 which may be riveted or otherwise secured to the frame formed by the bars described.

The front end 15 of the casing may be open, and the rear end of the casing may be closed by a plate 17 connected by angle bars 19 to the side plates and further closed by a top plate 21 connected by short angle bars 23 with the side plates. The materials to be graded may be guided from any suitable source into the casing by an inclined plate 25 connected by angle bars 27 with the side plates.

A screen or screens may be mounted in the casing, and in the present instance, two screens are employed, one an upper or scalper screen, and the other a lower or fine screen.

The upper screen comprises screen cloth ing 29 which may be stretched on a frame

comprising side members 31 of wood or other suitable material connected by end angle bars 33 and 35, said side members being also connected by transverse bars 37 of wood or other suitable material located intermediate the end angle bars. The side members are secured to the end bar 33 by clips 39 and to the end bar 35 by clips 41.

Flexible strips 42 are secured to the side members of the screen frame, and are adapted to engage the side plates 13 of the casing to prevent escape of materials from the screen into the spaces between the side edges of the screen and the side plates of the casing.

The lower screen, in the present instance of the invention, comprises screen clothing 43 stretched on a frame having side members 45 of wood or other suitable material connected by end angle bars 47 and 49, and also connected by transverse bars 51 of wood or other suitable material located intermediate the end bars. The side members are secured to the end bar 47 by clips 53 and to the end bar 49 by clips 55.

Flexible strips 56 are secured to the side members of the screen frame, and are adapted to engage the side plates 13 of the casing to prevent escape of materials from the screen into the spaces between the side edges of the screen and the side plates of the casing.

Suitable means may be provided for supporting the lower end of the upper or scalper screen. This means, in the present instance, is in the form of a cross member or pipe 57 extending horizontally between the side plates 13 of the casing, and the end portions of said pipe are tapped to receive screw bolts 59 which may be entered through holes 61 in the side plates. There are several of these holes, so that the pipe may be mounted in the casing at different elevations. The angle bar 33 at the lower end of the screen is adapted to rest upon and be supported by this pipe, and by varying the elevation of the pipe, the angle of the screen may be varied for most efficient grading of different kinds of materials.

The materials which are too large to pass through the meshes of the screen clothing, will flow down along the screen and over the lower end thereof. To guide these materials after leaving the screen, an inclined plate 63 may be provided having its lower end resting on the front base angle bar 1. To the upper portion of this plate, hooks 65 are secured, and are adapted to hang on the pipe 57, and the angle bar 33 at the lower end of the screen may in turn rest on these hooks. The pipe 57 will not only serve to support the lower end of the screen, but also will prevent the same from sliding downward in the direction of the plane of the screen.

Suitable means may be provided to support the lower end of the fine screen. This means, in the present instance, is in the form of a pipe 67, extending horizontally between the casing side plates 13, said pipe having its end portions tapped to receive screw bolts 69, which may be entered through selected holes 61 in the side plates. The end angle bar 47 of the screen rests upon and is supported by the pipe 67, and also prevents the screen from sliding downward in the direction of the plane thereof.

To prevent the materials delivered between the screens from mixing with the materials passing through the fine screen, a plate 71 may be provided having its lower end engaging a transverse angle bar 73 secured to the side base bars 1. To the upper portion of this plate are secured hooks 75 which are hung on the pipe 67, and the angle bar 47 in turn may rest on these hooks.

Beneath the upper member of the lower or fine screen are a pair of pins or elements 77 of wood or other suitable material mounted in sockets 79 secured to and depending from the top plate 21 referred to. The lower ends of these pins may rest upon buttons 81 supported by adjusting screws 83 provided with lock nuts 85. The construction is such that by adjusting the screws 83, the elevation of the pins 77 may be varied as required. The upper ends of said pins may be engaged by impact plates 87 secured to the angle bar 49 at the upper end of the fine screen.

Above the upper member of the scalper screen are a pair of screw bolts or elements 88 entered through holes in a channel 88^a mounted on and secured to the top inclined frame members 7, said bolts being adjustably secured to said channel by nuts 88^b. The heads of these bolts may engage impact plates 88^c secured to the upper angle bar 35 of the scalper screen.

Suitable means may be provided to support the upper end of the scalper screen from the fine screen. This means, in the present instance, being in the form of a pair of U-shaped feet 89 secured to the end angle bar 55 of the fine screen. The upper ends of these feet are adapted to engage impact plates 91 secured to the end angle bar 41 of the scalper screen.

The vibrating mechanism, in the present instance of the invention, comprises a casing 93 which may be mounted on a channel 95 secured to inclined angle bars 97 secured in turn to the angle bars 1 and 5 referred to.

The casing 93 comprises a pair of heads or parts 95 and 97 secured in assembled relation by through bolts 99. Mounted in this casing are ball bearings 101 in which is journalled a shaft 103. The head 95 has

an opening for receiving the shaft, and is closed by a cover plate 105 secured to the head by screw bolts 107. The head 97 has an opening through which the shaft 103 projects, and said head is provided with a counterbore at said opening receiving packing 109 held in said counterbore by a collar 111 secured to the head by screws 113.

The shaft is formed to present an eccentric 115 having a slight eccentricity, such, for example, as $\frac{1}{32}$ of an inch. To vary the effective eccentricity of the eccentric 115, a bushing 117 may be mounted thereon of a varying thickness. To secure this bushing in different positions of rotative adjustment, it may have tapered holes 119 circumferentially distributed in the bushing, and formed in the eccentric is a bore 121 adapted to receive a locking pin 123 having a reduced tapered end 125 adapted to enter into one of the holes 119 when brought into registration therewith. The pin is urged outward by a coil spring 127 having one end engaging the inner surface of the bushing, and having a portion entered into a recess 129 in the pin. In assembling the parts, the pin and the coil spring may be introduced into the bore 121 in the eccentric, and then the bushing may be slid longitudinally onto the eccentric, and thereby confine the spring in said bore. The spring will tend constantly to press the tapered reduced end 125 of the pin into the selected hole of the bushing, and on rotation of the eccentric, centrifugal force will contribute to this effect.

When it is desired to vary the effective eccentricity of the eccentric, the pin 123 is pressed inward by a suitable tool against the resistance of the spring. Then the bushing may be given a rotative adjustment to bring the desired hole in the bushing in registration with the reduced end of the pin. Thereupon, the latter will snap outward and automatically lock the bushing against rotation with respect to the eccentric.

To drive the eccentric shaft, it is extended outward beyond the head 97 and may be driven from any source of power. In the present instance, said shaft receives the armature 133 of an electric motor 135. The field 137 of the motor is mounted in a casing 139 secured by screw bolts 141 to an extension 143 on the head 97. This preferably is a high speed motor, and is adapted to drive the eccentric shaft at high speed, such, for example, as 1800 R. P. M.

Fast on the eccentric bushing 117 is a ring 145 having a raceway, and opposed thereto is a raceway of a ring or strap 147, balls 149 being provided between the rings. A shoe or follower 151 rests on the periphery of the ring 147, and has flanges at opposite sides of said ring to prevent the shoe from moving laterally off from the ring.

A rod 153 has a reduced end 155 entered into a boss on the shoe, and is secured thereto by a through pin 157. This rod projects upward through a column 159, having at the bottom thereof a flange 161 opposed to a flange 163 on the eccentric casing, said flanges being secured together by bolts 165. A plate 167 is confined between said flanges, and has an upstanding collar 169 projecting somewhat into the column.

Mounted on the upper end of the column is a collar 171 internally of square or rectangular form adapted to receive a similarly shaped sleeve 173 threaded on the rod 153, a bushing 174 being provided between said collar and sleeve. This sleeve has a free sliding fit in the collar, and confines the rod against rotation.

To lubricate the bushing and sleeve, a grease cup 175 may be provided connected by a pipe 177 with the collar 171. The casing containing the eccentric and ball bearings may be filled with grease which may be supplied by a grease cup 179 connected by a pipe 181 with one of the parts of the casing 93.

Secured to the upper end of the rod 153, is a U-shaped head 183 adapted to engage a plate 185 secured to the angle bar 55 at the upper end of the fine screen. To prevent lost motion between the raceway rings 145 and 147, the balls 149 and the follower 151, a coil spring 187 is provided in the column 159, and is confined between the base of the collar 171 and a nut 189 threaded on the rod 153. The nut may have an apron 191 depending therefrom and overlapping the upstanding sleeve 169 referred to, thereby to prevent dust from entering the casing containing the eccentric.

The construction is such that the eccentric in the course of its rotation will push the rod 153 upward, and the coil spring 187 will push the rod downward. Thus, any lost motion or backlash between the parts is prevented, and wear thereon is reduced to a minimum.

When the eccentric is rotated at high speed, the rod 153 and its head will be rapidly reciprocated with a small amplitude of movement, and the head will strike the plate 91 on the under side of the end angle bar 49 of the fine screen with a rapid succession of minute blows. Since the bar 49 has a resilient character, it will arch and flex more or less back and forth and strike the wooden pins 77 referred to, with a rapid succession of blows.

The end portions of the bar 49 may whip up and down with an amplitude of vibration greater than that of the middle of the bar which is in line with and receives the blows or reciprocatory movements from the eccentric actuated rod. The pins 77 may be adjusted to an elevation such that they will limit the amplitude of vibration of said

bar. The vibrations of the bar will be transmitted through the other members of the frame to the screen clothing thereon and keep the meshes thereof open for efficient grading effect.

The vibrations will be transmitted from the fine screen frame through the feet 183 to the upper frame bar 35 of the scalper screen. The end portions of said bar may whip up and down with an amplitude of vibration greater than that of the middle of the bar which receives blows from the feet 183. The bolts or elements 88 are struck by the end portions of said bar with a rapid succession of blows, and said bolts may be adjusted so that they will limit the amplitude of vibration of said bar. The vibrations of the bar will be transmitted through the other members of the frame to the screen clothing thereon, and keep the meshes thereof open for efficient grading effect.

The provision of the elements against which the screen frame members whip or strike a rapid succession of blows desirably contributes to the effective vibration of the screens.

Preferably the eccentric actuated member is not tied or connected to the screen or screens, so that they may have sympathetic vibrations independent of the pure harmonic motion of said member, and the screens may rock laterally more or less depending on conditions such, for example, as uneven distribution of materials thereon.

It may be desirable to press the screens downward toward the vibrating mechanism. To accomplish this, in the present instance, a spring pressure device is provided comprising a foot 193 having one end in engagement with the angle bar 35 at the upper end of the scalper screen, and having its opposite end downturned and resting on a channel 195 at the lower end of a plate 197 secured to a plate 198 and a strip 198ª secured to an angle bar 199 connected to the inclined angle bars 5 at the rear end of the casing. The plate 198 extends down to and stiffens the top plate 21. To prevent the foot 193 from sliding along the channel 195, a pair of blocks 201 may be secured in the channel at opposite edges of the foot.

A rod 203 is entered through a hole in the foot 193, and has a head 205 engaging the upper face of the foot. This rod projects downward through a hole in the top plate 21, and is urged downward by a coil spring 207 confined between said plate and an adjusting nut 209 which may be secured by a lock nut 211.

The construction is such that the coil spring 207 will tend to draw the rod 203 downward, and the latter in turn will press the foot 193 downward against the upper screen. This pressure will be transmitted from the upper screen through the feet 89 to the lower screen and to the head 183 reciprocated by the eccentric. The consequence is that if the coil spring 107 is adjusted to provide sufficient tension, the screens may be pressed downward so as to closely follow the reciprocatory movements of the eccentric actuated head, but preferably the spring is relaxed so as to permit the screens to be thrown upward more or less, and have a greater amplitude of movement than the eccentric reciprocated head. The movements of the head may be out of step with those of the lower screen, so that the head will meet the screen and add to the force of the blows of the head thereon.

The separator described is open at the top between the inclined angle bars 7 of the frame, thereby enabling ready inspection of conditions within the casing. If it is desired to remove the screens from the casing, the tension of the coil spring 207 may be relaxed and the foot 193 may be lifted from the upper screen. Thereupon, said screen is free to be lifted from the casing. This will expose the lower screen and permit the same readily to be lifted from the casing also if desired.

Since the motor, the eccentric mechanism, and the rod projecting up through the column are encased, they are protected from dust, and they are further protected from dust by the plates 17 and 21.

The eccentric mechanism is readily accessible for the purposes of inspection, adjustment and repair. To accomplish this, it is merely necessary to remove the bolts 99, thereby permitting ready separation of one of the heads 95 and 97 from the other, thereby fully exposing the parts within the casing.

The rods 57 and 67 may be adjusted independently up or down in order that their angles of inclination with respect to the horizontal may be suitable for the most efficient grading of the materials, and these adjustments may be made at the lower ends of the screens without affecting or disturbing the mechanism for reciprocating the screens.

It will be understood that the invention is not limited to the specific embodiment shown, and that various deviations may be made therefrom without departing from the spirit and scope of the appended claims.

What is claimed is:—

1. A separator for grading materials comprising, in combination, a screen, a casing beneath the screen, a shaft mounted in said casing, an eccentric on said shaft having minute eccentricity, a member reciprocated by the eccentric and extending upward to the screen and adapted to vibrate the screen, the latter being unattached to said member that it may have sympathetic vibrations independent of said member, and pins adapted to be struck by the vibrated screen, thereby

further to contribute to the vibration of the screen.

2. A separator for grading materials comprising, in combination, a screen having a frame and screen clothing, an eccentric having minute eccentricity and rotatable at high speed, and a member reciprocated by the eccentric and adapted to place said frame in a highly vibrant condition, said member being unattached to said screen; and elements against which said frame is vibrated, thereby further to contribute to the vibration of the screen.

3. A separator for grading materials comprising, in combination, a screen having a resilient frame and screen clothing, a member adapted to engage the upper end of the frame, and means including an eccentric for rapidly reciprocating said member, thereby to vibrate the resilient frame and cause portions thereof to vibrate with an amplitude of movement greater than that of said member; and elements engaged by said frame and limiting the amplitude of vibratory movement of said portions of the frame, thereby further to contribute to the vibration of the screen.

4. A separator for grading materials comprising, in combination, a screen having a frame and screen clothing, a hammer member for contact with said frame, and means rapidly to reciprocate said member and cause the same to strike the frame with a rapid succession of minute blows and place the screen in a highly vibrant condition, and fixed means against which the frame is vibrated, thereby further to increase the vibration of said frame.

5. A separator for grading materials comprising, in combination, a support including sockets and pins mounted in said sockets, a screen having a frame, an eccentric having minute eccentricity and rotatable at high speed, and means extending from the eccentric to the screen frame for placing said frame in a highly vibrant condition on said pins.

6. A separator for grading materials comprising, in combination, a support including sockets, pins mounted in said sockets adjustable to vary the elevation thereof, a screen having a resilient frame member and screen clothing connected to said member; and means including an eccentric for rapidly reciprocating said frame member with a small amplitude of movement, thereby to cause said member rapidly to vibrate against said pins and further contribute to the vibration of the screen.

7. A separator for grading materials comprising, in combination, a screen having a resilient frame and screen clothing connected to said frame; means for directly vibrating the screen frame including an eccentric having minute eccentricity and rotatable at high speed, said screen being unattached to said means and susceptible of vibrations independent of said means, and fixed means against which the screen is vibrated.

8. A separator for grading materials comprising, in combination, a plurality of screens, elements opposed to said screens, and means for vibrating the screens against said elements including an eccentric having minute eccentricity and rotatable at high speed, said screens being unattached to said vibrating means, that they may have independent vibratory movements against said elements.

9. A separator for grading materials comprising, in combination, upper and lower screens, elements beneath the lower screen, elements above the upper screen, and means including an eccentric for vibrating said screens against said elements, said eccentric having minute eccentricity, and an electric motor for rotating said eccentric at high speed.

10. A separator for grading materials comprising, in combination, a support, a cross member mounted on said support, an inclined screen having a frame and screen clothing, the lower end of said frame being supported on said cross member, means to prevent the screen from sliding down relatively to the cross member, a pair of elements on the support opposite the upper end of the screen frame, and means including an eccentric for causing the upper end of the screen frame to vibrate against said elements.

11. A separator for grading materials comprising, in combination, a support, an inclined screen mounted on the support and having a frame and screen clothing, a cross member on the support sustaining the lower end of the screen and adjustable to different positions for varying the angle of the screen, elements on the support opposite the upper end of the screen, and means including an eccentric for causing the screen frame to vibrate against said elements, said cross member being disposed in horizontal position on the support.

12. A separator for grading materials comprising, in combination, a screen having a frame and screen clothing, fixed elements opposite the frame, means for causing the frame to vibrate against said elements, and spring means for pressing the frame toward said elements and vibrating means.

13. A separator for grading materials comprising, in combination, a screen having a frame and screen clothing, fixed elements opposed to the frame, means for causing the frame to vibrate against said elements, and spring means for pressing the screen toward said elements and having provision for varying the pressure thereof.

14. A separator for grading materials comprising, in combination, a casing having

an open top, an inclined screen mounted in the casing, and having a frame and screen clothing, fixed elements mounted on the casing opposed to the frame, means for rapidly vibrating the frame against said elements, and spring means mounted on the casing for pressing the screen frame toward said elements.

15. A separator for grading materials comprising, in combination, upper and lower screens, each having a frame and screen clothing, a pair of pins opposed to the frame of the lower screen, means for vibrating the lower screen frame against said pins, and means separate from said vibrating means for transmitting vibrations from the lower screen frame to the upper screen frame.

16. A separator for grading materials comprising, in combination, upper and lower screens, each having a frame and screen clothing, a pair of pins opposed to the frame of the lower screen, means including an eccentric and a member actuated thereby for vibrating the lower screen frame against said pins, and means separate from said member for transmitting vibrations from the lower screen frame to the upper screen frame.

17. A separator for grading materials comprising, in combination, upper and lower inclined screens, each having a frame and screen clothing, means for supporting said screens at different angles, elements opposed to the lower screen frame, means for vibrating the lower screen frame against said elements, means for transmitting vibrations from the lower screen frame to the upper screen frame, and means including a spring pressed rod acting on the upper screen frame for pressing the screens downward toward said elements.

18. A separator for grading materials comprising, in combination, a casing, upper and lower inclined screens mounted in said casing, each having a frame and screen clothing, elements mounted on the casing opposed to the lower screen frame, means including an eccentric for vibrating the lower screen frame against said elements, means for transmitting vibrations from the lower screen frame to the upper screen frame, and means for pressing said screens downward including a foot resting partly on the casing and partly on the upper screen frame, and spring means for urging said foot downward.

19. A separator for grading materials comprising, in combination, a screen and means for vibrating said screen including a shaft having an eccentric thereon, a bushing of varying thickness mounted on the eccentric, said bushing being rotatively adjustable on the eccentric to vary the eccentric effect thereof, said eccentric and bushing having holes circumferentially spaced on one, and a spring-pressed element on the other adapted to enter any one of said holes, thereby to lock the bushing in its different positions of rotative adjustment, and means for transmitting vibratory movements from the eccentric bushing to the screen.

20. A separator for grading materials comprising, in combination, a screen and means for vibrating the screen including a shaft having an eccentric thereon, a bushing of varying thickness on the eccentric, said bushing having holes circumferentially spaced therein, a spring-pressed element adapted to enter any one of said holes to lock the bushing in different positions of rotative adjustment with respect to the eccentric, and means to transmit reciprocatory movements from the eccentric to the screen.

21. A separator for grading materials comprising, in combination, a casing, an inclined screen mounted therein, a horizontal rod connected to the casing, beneath and supporting the lower end of the screen, a plate hung on the rod for guiding materials leaving the screen, and means for vibrating the screen.

22. A separator for grading materials comprising, in combination, a casing, inclined screens mounted therein, horizontal rods carried by the casing, beneath and supporting the lower ends of said screens, plates hung from said rods for guiding materials leaving the lower ends of said screens, and means for vibrating said screens.

23. A separator for grading materials comprising, in combination, a casing, an inclined screen mounted therein, an eccentric mechanism for vibrating the screen, a casing for the eccentric mechanism, said first-named casing having a wall for separating the eccentric mechanism from the materials graded, and elements mounted on said wall adapted to be struck by the screen when reciprocated by the eccentric mechanism, thereby further to contribute to the vibration of the screen.

24. A separator for grading materials comprising, in combination, a support, inclined screens mounted thereon, means for vibrating said screens including an eccentric having slight eccentricity and means beneath the upper ends of the screens for imparting reciprocatory movements from the eccentric to the upper ends of the screens, and means to support the lower ends of the screens and having provision for independently varying the angles thereof with respect to the horizontal, said vibrating means being unattached to the screens.

25. A separator for grading materials comprising, in combination, a screen, and means for vibrating the screen including a shaft having an eccentric thereon, a bushing of varying thickness on the eccentric,

said bushing being rotatively adjustable on the eccentric to vary the eccentric effect thereof, said eccentric and bushing having holes circumferentially spaced on one and a locking element on the other movable radially of the eccentric into any one of said holes, and means for transmitting vibratory movements from the eccentric bushing to the screen.

26. A separator for grading materials comprising, in combination, a screen, and means for vibrating said screen including a shaft having an eccentric thereon, a bushing of varying thickness on the eccentric rotatively adjustable to vary the eccentric effect thereof, a strap for the eccentric, means for transmitting vibratory movements from the strap to the screen, said bushing having a portion laterally offset from said strap, and means cooperating with the shaft and the laterally offset portion of the bushing for locking the bushing in different positions of rotative adjustment with respect to the eccentric.

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