No. 755,330. PATENTED MAR. 22, 1904.

T. L. & T. J. STURTEVANT.

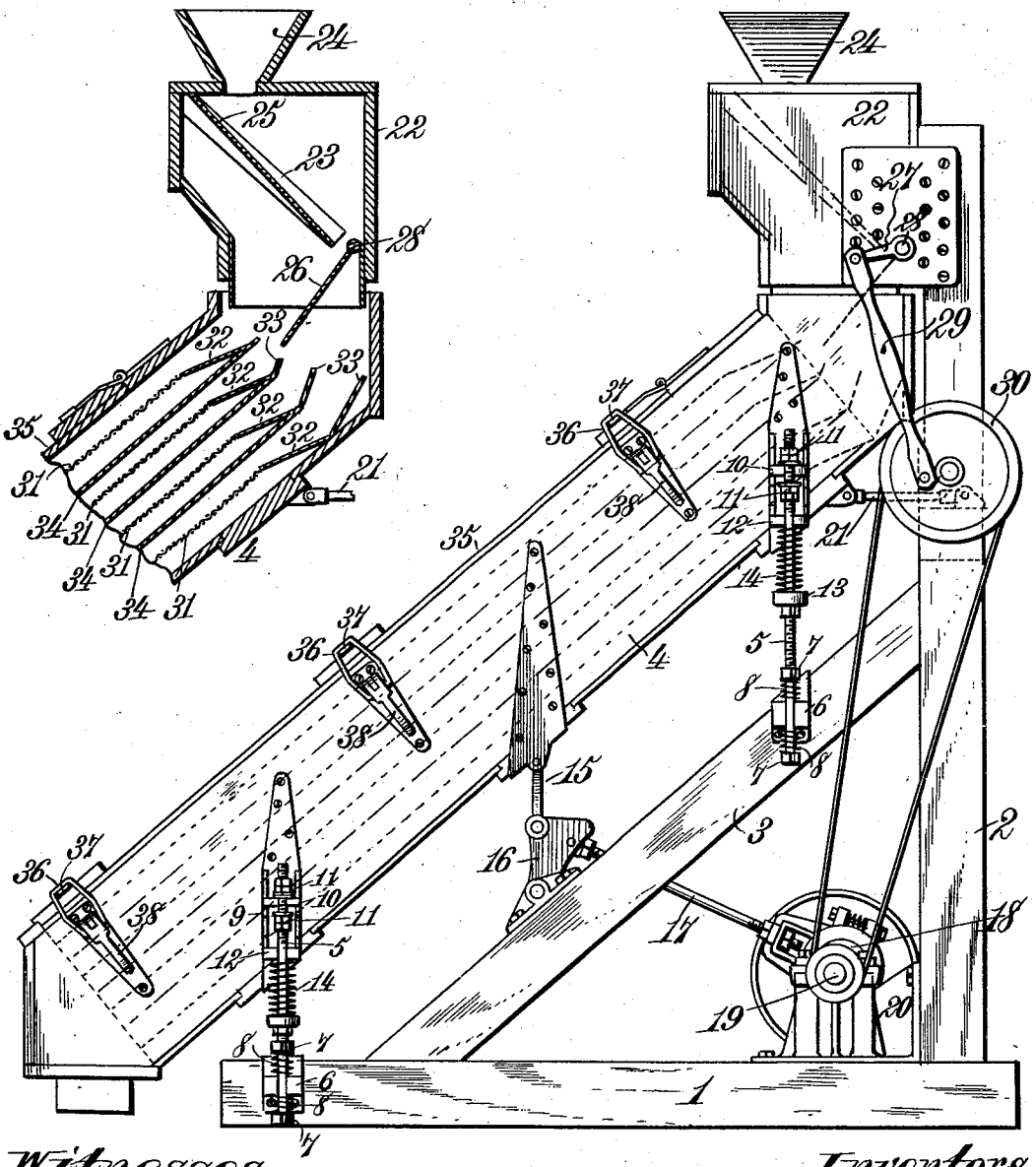
SHAKING SCREEN.

APPLICATION FILED MAR. 19, 1902.

NO MODEL. 2 SHEETS—SHEET 1.

Fig. 2.

Fig. 1.



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NO MODEL. 2 SHEETS—SHEET 2.

Fig. 3.

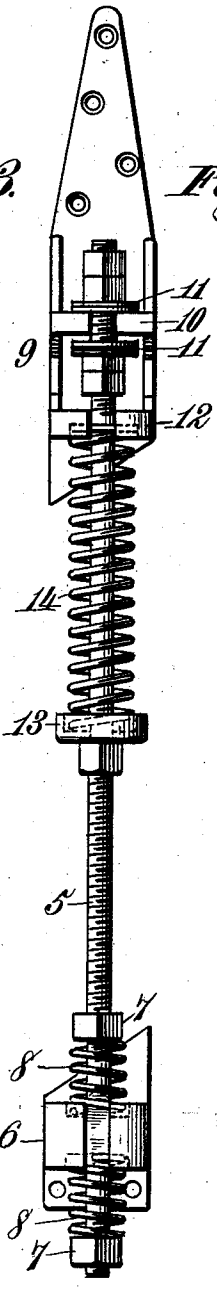


Fig. 4.

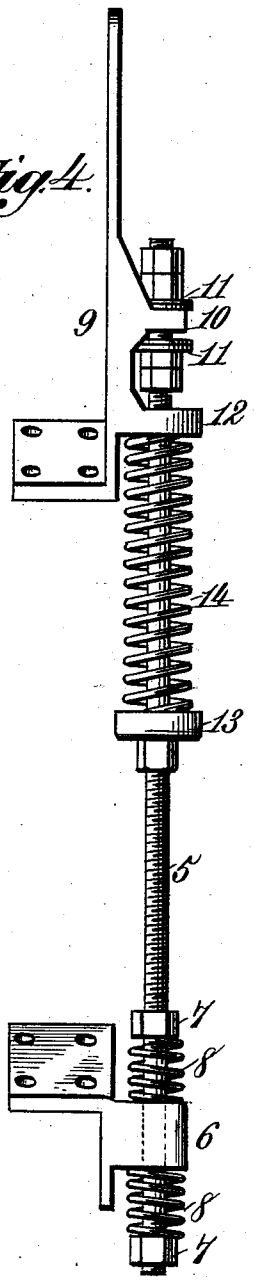


Fig. 6.

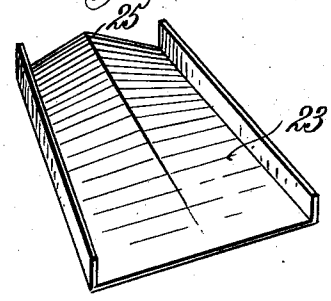


Fig. 5.

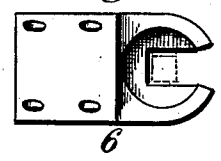
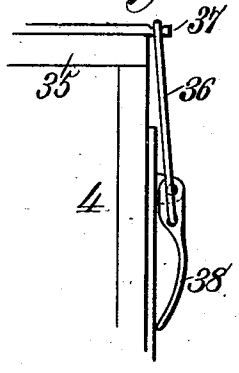


Fig. 7.



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No. 755,330. Patented March 22, 1904.

UNITED STATES PATENT OFFICE.

THOMAS L. STURTEVANT, OF QUINCY, AND THOMAS J. STURTEVANT, OF NEWTON CENTER, MASSACHUSETTS, ASSIGNORS TO STURTEVANT MILL COMPANY, OF PORTLAND, MAINE, AND BOSTON, MASSACHUSETTS, A CORPORATION OF MAINE.

SHAKING-SCREEN.

SPECIFICATION forming part of Letters Patent No. 755,330, dated March 22, 1904.

Application filed March 19, 1902. Serial No. 98,937. (No model.)

To all whom it may concern:

Be it known that we, THOMAS L. STURTEVANT, residing at Quincy, Norfolk county, and THOMAS J. STURTEVANT, residing at Newton Center, Middlesex county, State of Massachusetts, citizens of the United States, have invented certain new and useful Improvements in Shaking-Screens, of which the following is a specification, reference being had therein to the accompanying drawings.

This invention relates to screens, and particularly to that class of screens in which an inclined screen box or casing is provided having therein one or more screening-surfaces and screen-pans down which the material to be separated flows, the screen-box being vibrated by suitable means in order to give a "shake" or vibratory screening action to effect the separation of the material, suitable feeding devices to deliver the material to the screening-surfaces being provided at the upper end of the screen-box, while suitable devices to effect the separate delivery of the screened material and tailings are placed at the lower end of the screen-box.

The screen which forms the subject-matter of the present case is an improvement on the screen shown and described in our application filed August 31, 1901, Serial No. 73,925, the present construction embodying improved screen-box supports, operating mechanism, feeding devices whereby the efficiency of the screen is increased and the construction simplified, and certain other details which will appear hereinafter.

In the drawings which accompany this case is illustrated one embodiment of the invention, and in said drawings—

Figure 1 is a side elevation of the improved screen, its supporting-frame, and operating instrumentalities. Fig. 2 is a sectional view of the upper part of the screen, shown in Fig. 1, to illustrate the interior arrangement of the screen-box, the feeding-hopper, and the feed-controlling instrumentalities. Fig. 3 is an enlarged detail view of one of the spring-supports for the screen-box. Fig. 4 is a side view of the support shown in Fig. 3. Fig. 5 is a detail view of one of the supporting-castings forming a part of the spring-support shown in Figs. 3 and 4. Fig. 6 is a view in perspective of the novel form of feeding or distributing plate with which the feed-box is provided. Fig. 7 is a detail view of one of the novel clamping devices by means of which the screen-box cover is secured in place.

Referring to the drawings by numerals, like numbers indicating like parts in the several views, the supporting-frame of the screen is preferably formed of suitable base-pieces 1 from which rise uprights 2, said base-pieces and uprights being braced and connected by means of angle-braces 3, all as shown in Fig. 1 of the drawings. Mounted upon said frame in an inclined position is the screen-box or casing 4, which is mounted upon spring-supports, said supports comprising screw-threaded rods 5, removably fixed in open ears 6 on suitable castings secured to the frame of the screen. Said rods 5 have their lower ends flattened, as shown, so as to prevent turning in the squared openings in ears 6, through which they pass, thus permitting adjustment of the nuts (to be described) without rotating the rods. Said rods are held in place by means of nuts 7 above and below the ears 6, relief-springs 8 of considerable stiffness being interposed between said nuts 7 and the ears 6, so as to allow movement of the rods 5 in either direction under severe strain and prevent any breakage of the parts owing to undue pull or thrust on the said rods, said springs 8 forming spring-mountings for the rods 5 and their supported parts. The ears 6 have seats or sockets formed on either side, (see Fig. 5,) which receive the ends of the springs 8 and prevent accidental unshipping or displacement of the rods 5. Secured to the sides of the screen-box 4 are eared castings 9, the upper open ears 10 of which play between adjustable padded stops or bumpers 11, said stops being shown in the present instance as made up of nuts and washers adjust-

able on the rod 5, with disks of yielding material to absorb shock between the washers and ears 10. Between the lower ears 12 of the casting 9 and cup-disk 13, adjustably mounted on the rods 5, are placed springs 14, the lower side of the ears 12 being cupped or provided with seats similar to the ears 6, above described, to receive the ends of springs 14 and hold the parts in their working positions. The said springs 14 are preferably adjusted so as to just balance the screen-box 4 and its load and hold the screen-box 4 as nearly as possible in its mean position with the ears 10 midway between the stops or bumpers 11 11. Such a balanced arrangement relieves the driving mechanism, presently to be described, of strain and minimizes the driving power necessary to operate the screen, for the reason that the balancing-springs 14 give an impetus to the box in one direction and ease its movements in the other direction, so that by just balancing the box by properly adjusting the springs 14, the strain on the driving mechanism is materially less than is the case where the screen-box is carried by "dead" or inelastic supports.

Secured to the screen-box, substantially midway its length, is one member, 15, of a toggle, the other member, 16, of said toggle being secured to a stationary part of the screen-frame, preferably to the inclined brace, and said toggle has connected therewith a suitable driving device, shown in the present instance as a pitman 17, which is adjustably connected with the eccentric 18, mounted on a driving-shaft 19, supported in suitable bearings 20 on the screen-frame. At the upper end of the said screen-box is a pivotally-mounted rod or radius-bar 21, by means of which the said screen-box is pivotally tied or connected to a cross-bar spanning the uprights 2 of the screen-frame, (see Fig. 1,) so as to limit and control the movements of the box 4 and insure its reciprocation in a substantially vertical direction under the influence of the toggle mechanism.

It will be obvious that the spring-mounting of the screen-box-supporting rods 5 might permit wabbling of the box during its reciprocations unless some provision, such as the radius-bar 21, just described, were not made to keep the screen-box in a substantially vertical path. By providing this radius-bar the advantage of the spring-mountings is retained and the objectionable side play of the screen-box is overcome.

Secured to the upper end of the uprights 2 is a feed-box 22, the lower reduced end of which depends within the upper end of the screen-box 4, so that as the screen-box is moved up and down it telescopes over the lower end of the feed-box 22 and forms a sufficiently tight, although freely-sliding, connection between the two parts, thus preventing the escape of material at the joint between the stationary feed-box and the vibrating screen-box. Within the said feed-box 22 is an inclined distributing plate or chute 23, which receives the material that is poured into the feed-box through the hopper-opening 24 from any suitable source of supply. The said distributing-plate 23, which is shown in detail in Fig. 6, is preferably slightly narrower at its upper end than at its foot and is formed with a raised central ridge 25, which gradually decreases in height and vanishes as it approaches the lower end of the plate, so that the material which flows in through the feeding-hopper 24 in a comparatively bulky stream will flow upon this rigid distributing-plate 23 and be divided and fanned out in an even layer upon the surface of the distributing-plate 23, so as to fall from the lower end thereof in a relatively thin even stream, and the material will thus flow to the feed-plate and mately in a broad shallow stream of approxi-screens the width of the screening-surfaces, and uneven feeding and imperfect screening will thus be avoided.

As the material flows from the lower end of the distributing-plate 23 it falls upon the swinging feed-plate 26, which plate 26 is given a regular swinging movement by means of a crank-arm 27, connected with the pivoted shaft 28, on which the feed-plate 26 is mounted, the said crank-arm 27 being driven by means of a pitman-rod 29, connected with a crank-wheel 30, mounted on the screen-frame, said crank-wheel being belted to and receiving its motion from a small pulley on the main driving-shaft 19. The said feeding-plate 26 extends downward in proximity to the tops of the screens 31 within the screen-box 4 and has a regular movement past the mouths of the screens 31, which are mounted in the screen-box, as shown in Figs. 1 and 2, the said screens 31 being provided at their upper ends with inclined portions 32, upon which the material falls and passes to the screening areas, upwardly-turned lips 33 at the upper ends of the screens insuring the delivery of the material to the screens from the swinging plate 26. Beneath the said screens 31 are placed the usual screen-pans 34, which receive the screened material passing through the screens, while the tailings or unscreened products continue down the screens to the lower end of the screen-box 4, where any suitable devices for effecting the separate delivery of the screened material and the tailings—such as, for example, the devices shown in our application above referred to—are placed. The said screen-box 4 is preferably provided with a cover 35, hinged at its upper end, so as to permit access to and the ready repair or removal of the screens and screen-pans, said cover being secured at its side edges, so as to give a dust-proof closure, by means of clamping-bails 36, which at their upper ends engage projections or hooks 37 and at their lower ends are secured to locking-levers 38, pivoted to the sides of the screen-box, as shown in Figs. 1 and 7. It will be

noticed that the said spring-bails are spread at their middle, so as to yield and clamp the cover 35 with a spring action as the levers 38 are thrown to their locking position, so that the said cover is securely and tightly closed, and, furthermore, the spring action of the bails holds the levers 38 tightly locked when they are thrown down to their locking position past the center of the line of strain, as shown in Fig. 7, and accidental unlocking under the jar of operation is obviated.

The operation of the screen is as follows: The screen-box supports having been adjusted to the throw of the toggle and the driving-shaft 19 being started, the pitman-rod 17 will throw the toggle first to one side and then to the other of its center, pulling down the screen-box 4 against the balancing-springs 14 and bumping it against the lower stops or bumpers 11, the return throw of the toggle raising the screen and giving it a second bump against the upper stops 11. The result of this action is that a rapid vibration is imparted to the screen-box, and the material which is being constantly fed from the swinging feed-plate in regular order to each of the series will at each bump or stoppage be thrown from the screen-surfaces in a vertical direction, the shake thus imparted to the screen-box insuring an effective screening or separation of the material under treatment, the radius-bar 21 confining the movements of the screen-box 4 to a practically vertical direction and preventing any sidewise or angular movements of the same on its spring-supports. It will be seen that the springs 14 may be compressed more or less by means of the adjustable stops 13, and so their lifting power may be nicely adjusted to the weight of the screen-box. The adjustment of the stops 11 at the upper end of rods 5 will increase or lessen the bumping action, as desired, and in event of the inaccurate adjustment of the said stops 11 or of the toggle mechanism any breaking strain on the parts incident to such inaccuracy of adjustment will be relieved by the relief-springs 8 at the lower end of rod 5.

It will be obvious that the construction shown and described is of peculiar value in the art to which it belongs for the reason that a screen is provided in which the screening instrumentalities are suspended and balanced upon spring-supports, so that the structure and the operating parts are relieved to a large extent of the strain and wear incident to machines of this type in which such spring-supporting and relief devices are lacking. It is further apparent that the construction shown and described is capable of ready assemblage and adjustment, the open-eared supporting-castings in which the spring-supports are mounted allowing the parts to be readily separated for shipping and yet permitting their setting up by any one in their operative relations. The distributing and feed plates are also of great value, in that they insure a regular and even flow of material to the screens and eliminate the possibility of uneven feeding of the screens.

It will be understood that while we have shown and described a particular construction the inference is not to be made that we limit ourselves to any of the details shown and described, as the invention is capable of considerable variation within the range of mechanical skill, and we do not, therefore, limit ourselves, except so far as we are limited by the terms of the appended claims, to anything herein shown and described.

Having thus described our invention, we claim and desire to secure by Letters Patent—

1. In a screen, and in combination, a frame, fixed screen-supports mounted thereon, a screen slidingly mounted on said supports, means for vibrating said screen, fixed stops on said supports between which said screen vibrates and by which its movements are suddenly arrested, and springs independent of the screen-vibrating mechanism for upholding said screen and balancing it midway of the said stops.

2. In a screen and in combination, a frame, screen-supporting rods carried by said frame, a screen slidingly mounted on said rods, fixed stops on said rods to limit the sliding movement of said screen on the said supporting-rods, springs encircling said rods to uphold said screen and balance it midway between said stops, and means for vibrating said screen between said stops.

3. In a screen, the combination with a suitable frame, of screen-supports yieldingly mounted on said frame so as to give vertically under abnormal screen vibrations, a screen slidingly mounted on said yielding supports, means for vibrating said screen, rigid stops on said supports between which said screen vibrates and by which its movements are suddenly arrested, and balancing-springs on said supports to hold said screen midway between said rigid stops.

4. In a screen, the combination with a suitable frame, of screen-supporting rods yieldingly mounted on said frame so as to give vertically under abnormal screen vibrations, an inclined screen slidingly mounted on said rods, means for vibrating said screen, rigid stops adjustably mounted on said rods, between which said screen vibrates and by which its movements are suddenly arrested, and balancing-springs encircling said rods and supporting said screen midway between said rigid stops.

5. In a screen, the combination with a suitable frame, of screen-supporting rods yieldingly mounted on said frame so as to give vertically under abnormal screen vibrations, an inclined screen slidingly mounted on said rods, means for vibrating said screen, rigid stops adjustably mounted on said rods, between

which said screen vibrates and by which its movements are suddenly arrested, balancing-springs encircling said rods and supporting said screen midway between said rigid stops, and means for varying the tension of one or more of said springs to adjust them to the weight of the screen.

6. In a screen, the combination with a suitable frame, of screen-supporting rods having spring-mountings on said frame so as to give vertically under abnormal screen vibrations, an inclined screen slidingly mounted on said rods, means for vibrating said screen, rigid stops adjustably mounted on said rods, between which said screen vibrates and by which its movements are suddenly arrested, spiral balancing-springs encircling said rods and supporting said screen midway between said stops, and adjusting-nuts on said rods to vary the tension of said springs.

7. In a screen, the combination with a suitable frame, of screen-supporting rods having spring-mountings on said frame so as to give vertically under abnormal screen vibrations, an inclined screen slidingly mounted on said rods, means for vibrating said screen, rigid stops adjustably mounted on said rods between which said screen vibrates and by which its movements are suddenly arrested, spiral balancing-springs encircling said rods and supporting said screen midway between said stops, adjusting-nuts on said rods to vary the tension of said springs, and a radius-bar forming a pivotal connection between said screen and frame to confine the movements of said screen to a vertical direction.

8. In a screen, the combination with a suitable frame, of open-eared supports on said frame, screen-supporting rods mounted in said supports and vertically movable therein, supporting-springs on said rods, said springs being held between said supports and adjustable nuts on said rods, a screen having supporting-ears engaging said rods at their upper ends, adjustable rigid stops between which said screen-supporting ears play and by which the movements of said screen are suddenly arrested, means for vibrating said screen vertically on its supporting-rods, and balancing-springs to hold said screen midway between said rigid stops mounted on said rods between said screen-supporting ears and adjustable nuts.

9. In a screen, the combination with a suitable frame, of a stationary feed-box mounted thereon, a screen-box supported by said frame and provided with a plurality of screens, means for vibrating said screen-box vertically, a telescoping feeding connection between said stationary feed-box and said vibrating screen-box, and means within said feed-box to deliver material to each of the screens in regular succession.

10. In a screen, the combination with a frame, of a plurality of inclined screens, a stationary feed-box above said screens, means for vibrating said screens vertically toward and from said feed-box, and a swinging feed-plate within said feed-box to deliver material to each of the mouths of said inclined screens in regular succession.

11. In a screen, the combination with a frame, of a stationary feed-box mounted thereon, a screen-box having a telescoping connection with said feed-box and provided with a plurality of screens, means for vibrating said screen-box toward and from said feed-box, a distributing-plate in said feed-box, and a moving feed-plate to receive the material from said distributing-plate and deliver it to each of the plurality of screens in regular succession.

12. In a screen, the combination with a frame, of a stationary feed-box, a screen-box mounted on said frame and having a feeding connection with said feed-box, a plurality of screens in said screen-box, means for vibrating said screen-box, a distributing-plate having a spreading ridge mounted in said feed-box and adapted to deliver the material from its lower end in a relatively thin even stream, and a swinging feed-plate to receive the material from said ridged distributing-plate and deliver it to each of said screens in regular alternation.

13. In a screen, the combination with a frame, of a plurality of inclined screens, a stationary feed-box above said screens, means for vibrating said screens vertically toward and from said feed-box, a stationary ridged distributing-plate within said feed-box to spread the material out into a thin, uniform stream, and a swinging feed-plate which receives the material from said distributing-plate and delivers it in regular succession to each of the mouths of said inclined screens.

In testimony whereof we affix our signatures in presence of two witnesses.

THOMAS L. STURTEVANT.
THOMAS J. STURTEVANT.

Witnesses:
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