

No. 755,073.

PATENTED MAR. 22, 1904.

T. L. & T. J. STURTEVANT.

SCREEN.

APPLICATION FILED AUG. 31, 1901.

NO MODEL.

2 SHEETS—SHEET 1.

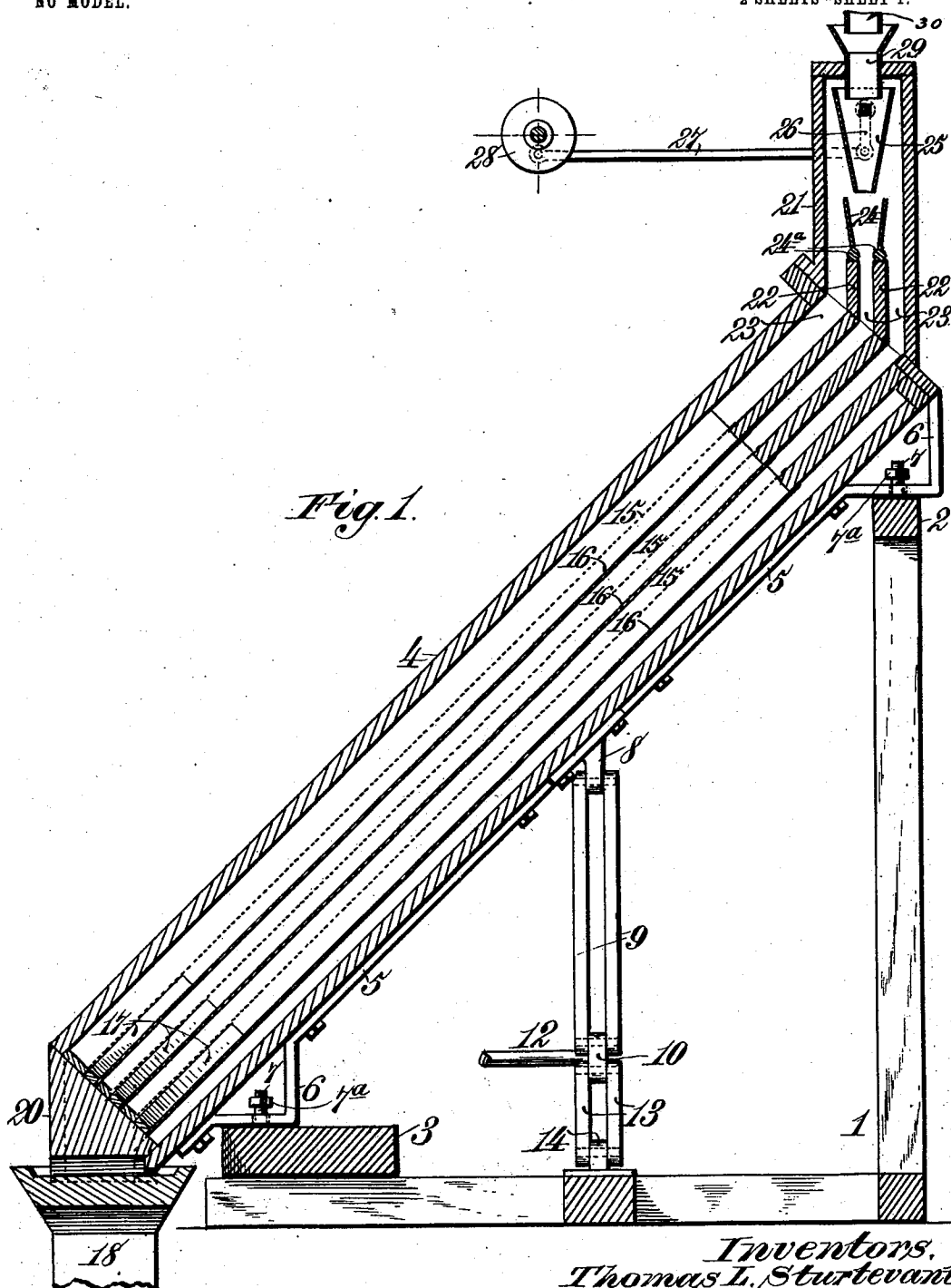


Fig. 1.

Witnesses.
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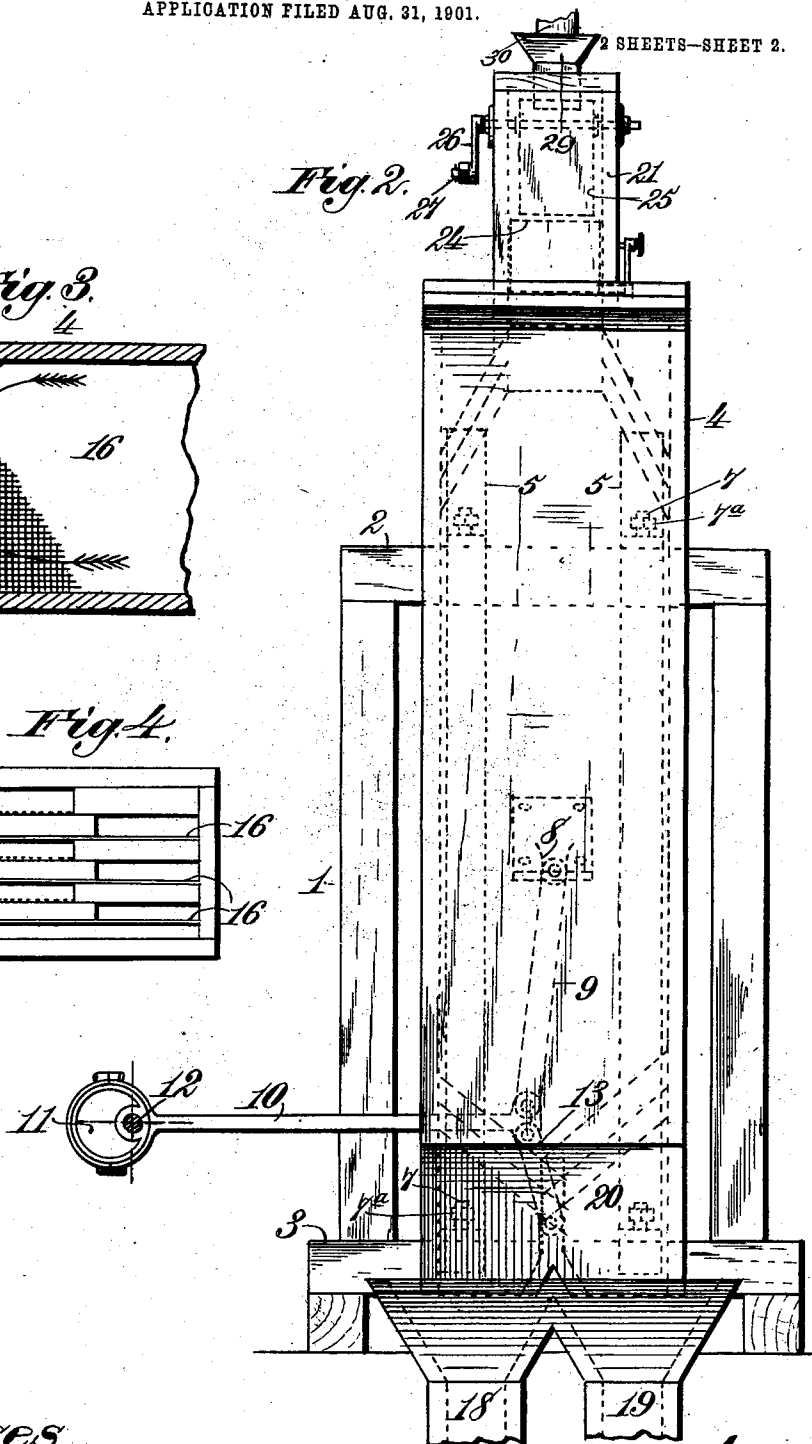
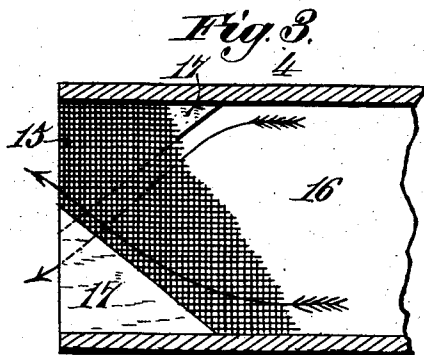
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SCREEN.

APPLICATION FILED AUG. 31, 1901.

NO MODEL.

2 SHEETS—SHEET 2.



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UNITED STATES PATENT OFFICE.

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

SCREEN.

SPECIFICATION forming part of Letters Patent No. 755,073, dated March 22, 1904.

Application filed August 31, 1901. Serial No. 73,925. (No model.)

To all whom it may concern:

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

The present invention relates to screens for separating coarse and fine materials, the materials in connection with which the apparatus is designed to be used being broken vitreous material, although it will be understood that it may, if desired, be used for screening any other material, and has for its object to provide a construction in which a maximum area of screening-surface will be provided in compact arrangement, so that the screen while capable of a large output is comparatively small, occupies but little space, is convenient for shipping, and because of its compact construction may be made much stronger and more capable of resisting wear on its active parts than a screening-machine having the same screening area would be if its screening-surfaces were less compactly arranged than in the present construction. In the present invention an improved driving mechanism is also provided which will impart the proper vibratory movements to the screening elements, so as to thoroughly separate the material thereon, and yet not necessitate a rapid running of such driving parts, whereby wear and tear on the machine is eliminated, means for jarring the screens to cause movement of the material and sifting being also provided. Furthermore, an improved feeding device to deliver the material to be screened to the screening-surfaces is provided which will insure an even continuous feed to the screens, resulting in an even spreading of the material upon the screens, which facilitates the separation of the material under treatment.

In the accompanying drawings is illustrated one embodiment of our invention.

In said drawings, Figure 1 is a side view, partly in section, of the supporting-frame for the screen-box, the screen-box, and feeding-hopper and the mechanism for imparting movement to the said hopper. Fig. 2 is a front view of the screen-box and its parts, showing also a portion of the delivery-chutes for the screened material and the tailings, the shaking mechanism for the screen-box being clearly shown in this view. Figs. 3 and 4 are detail views of the lower end of the screen-box.

Referring to the drawings by numerals, like numbers indicating like parts in the several views, 1 indicates a frame of any suitable construction, the present frame being shown as consisting of base-pieces and uprights, and at the upper end of said frame is a rigid support formed of a block 2, which will be termed in the description hereinafter a "pounding-block." A similar pounding-block 3 is mounted on the base of the frame, as clearly shown in Fig. 1. Resting upon the said pounding-blocks 2 and 3 is the inclined screen-box 4, said box being shown in the present instance as supported by iron straps 5, secured to its under side, said straps 5 being provided at their upper and lower ends, respectively, with bent-out portions 6, which rest upon the pounding-blocks 2 and 3 at the upper and lower ends, respectively, of the frame 1 and form supports for the said inclined screen-box 4. The said box 4 is preferably held in position upon said pounding-blocks by means of bolts 7, which pass through holes in the said bent-out portions 6, the said bolts 7 being long enough to permit a limited vertical movement of the screen-box for a purpose which will presently appear, said bolts 7 having nuts 7^a at their upper ends. Secured to said screen-box 4 is a depending lug 8 substantially midway the length of the box 4, and from said lug 8 depends one lever of a toggle, the said lever being shown in the present case as made up of two links 9, the said links 9 at their lower ends engaging with the end of an eccentric-rod or pitman 10, the other end of said rod

10 being connected by an ordinary eccentric-strap with an eccentric 11, mounted on a shaft 12, which receives a rotary motion from any suitable power. (Not shown.) The other lever 5 of the toggle is composed of two links 13, connected at their upper ends to the head of the said pitman 10, said links 13 being connected at their lower ends with a fixed part, said fixed part being shown in the present case as a lug 14 on the base of the screen-frame. It will be seen that as the eccentric 11 is rotated a thrust will be imparted to the rod 10, which will force the toggle past the center and lift the screen-box until its upward movement is suddenly arrested by the nuts 7^a of the bolts 7 and that after the said toggle has been thrown to the other side of the center the box 4 will drop upon the pounding-blocks 2 and 3, so that its downward movement will be suddenly arrested with sufficient force to jar and agitate the material upon the screens within the screen-box and cause it to slide down and sift through the screens. It will be seen, furthermore, that as the eccentric-rod 10 is drawn back during the revolution of the eccentric the toggle will be thrown to the other side of its center and the screen-box 4 will be again raised, so that to each revolution of the eccentric and reciprocation of the eccentric-rod 10 two shaking movements will be imparted to the said screen-box 4, so that a comparatively rapid vibration of the box 4 is secured, with a slow movement of the eccentric 11 and its rod 10.

It will be seen that the bolts 7, with their nuts 7^a, serve to limit the movement of the screen-box, and they also guide the said box so as to confine its movements to a vertical direction, and the material on the screen is agitated by the abrupt stopping of the vertical movements of the screen-box.

Attention is directed particularly to the fact that while the screen-box 4 and its screens are inclined to the vertical their movements are bodily in a vertical direction without changing the angle of inclination of the screen-box, and the material under treatment will because of this vertical "shake" or movement be thrown upward in a vertical line from the surface of the screen and will fall in the same vertical path and upon the same spot from which it was thrown by the shake, so that any movement of the material lengthwise the screen will be a sliding screening movement along the screen-surface and will not occur while the material is in the air. The result of this action is that the material is subjected to a thorough screening action and the entire area of the screen-surface is utilized, there being no tendency on the part of the material to be projected lengthwise the screen and fall at a point forward of the point at which it is thrown from the screen by the shake, as would be the case if the shake or movement of the screen were in a direction

at an angle to the vertical, for if the material leaves the screen-surface on any other than a vertical line it will not fall upon the spot from which it was thrown, but will drop vertically from the point where its upward movement ceases, so that it will skip or jump portions of the screening-surface and will not be subjected to the action of the entire screening area.

Mounted within the said inclined screen-box 4 and running longitudinally thereof are a plurality of superposed screens 15, three being shown in the present instance, and below each of said screens 15 is a screen-pan 16 to receive the "fines" or screened material. The lower end of the screen-box is provided with a series of guide-plates 17, which deflect the material sliding down the screens and screen-pans, said plates 17 being arranged in reverse position on each side of the box 4 alternately and being provided with inclined inner edges, so that during the operation of the machine the tailings which fail to pass the screens will be deflected to one side of the screen-box and delivered to one of the delivery-chutes, as 18, while the fines or screened material will be diverted to the other side of the screen-box and into the other delivery-chute, 19, the said deflecting-plates being made, preferably, as shown in the detail views, Figs. 3 and 4, of solid triangular plates, which overlap slightly at their inner lower angles, and so form a very rigid construction and add materially to the strength of the screen-box 4 and the screen-supports. The lower end of the said screen-box 4 is preferably provided with a perpendicularly-placed extension 20, (see Fig. 1,) which directs the material from the screens and screen-pans to the delivery-chutes.

Mounted upon the upper end of the screen-box is a hopper-casing 21, the lower end of which is provided with a series of partitions 22, which divide the said hopper-casing into as many feedways as there are screens in the screen-box 4, with which the hopper-casing 21 is in communication, each of said feedways 23 leading to one of the screens in the screen-box 4. Said partitions 22 are provided at their upper ends with feed deflecting or regulating gates 24, which are adapted to be swung to various angular positions, as shown in Fig. 1, in which figure the said gates 24 are shown as pivoted to the tops of the said partitions 22 upon suitable pivot-rods 24^a, passing through the hopper-casing, any appropriate means for swinging said plates 24 on their pivots and maintaining them in their several adjusted positions being provided. It will be clear that by swinging the said pivoted plates to their various positions it is possible to so regulate the flow of material to the screens through the several feedways as that the flow may be accurately proportioned between the screens, a result which, in connection with the novel

feeding-hopper presently to be described, is essential to the satisfactory working of the screen. It will also be apparent that by throwing the regulating-gates 24 to their extreme positions it will be possible to cut off entirely the feed through any one or any two of the feedways 23, if this should be desirable, and thus put one or two of the screens in the screen-box 4 out of service. Pivoted in said hopper-casing 21 above and clear of the plates 24 is a pendulum-like hopper or feeding-chute 25, which receives a regular swinging movement from a crank-arm 26, attached to the pivot-rod of the hopper 25, said crank-arm being rocked by means of a pitman or crank rod 27, connected with a suitable crank-wheel 28, said crank-wheel 28 being driven from any suitable power. (Not shown.) It will be seen that as the said swinging hopper 25 is given a regular movement during the rotation of the crank-wheel 28 its lower feeding end will swing back and forth above the mouths of the several feedways 23, which lead to the screens, and it will be clear that the said hopper 25 will as it reverses motion for the return swing make a slight dwell at the end of its stroke over the mouths of the two outer feedways 23, so that if the entrances to said outer feedways were the same size as the entrance or mouth to the middle feedway a greater quantity of material would be delivered to the said outer feedways and their screens than would be received by the said middle feedway and its screen. In order, therefore, to proportion the feed so that each screen shall receive the same amount of material, the feed-deflecting plates 24 are thrown to the proper position to proportion the size of the mouths of the outer feedways 23 to the time it takes the hopper 25 to move twice over said feedways, making the mouths of the outer feedways smaller than that of the middle feedway, so that the delivery to the outer and inner feedways and their respective screens is made practically uniform. The upper end of the said hopper-casing 21 carries a delivery-chute 29, which receives the material to be screened from any suitable spout 30 and delivers it to the swinging hopper 25.

While we have shown and described a particular structure, we do not wish to be understood as limiting our invention to any of the details of construction set forth, as what is shown and described is merely one embodiment of our invention, and it will be clear that the structure shown may be widely varied within the range of mechanical skill without departing from the spirit of our invention, and we do not, therefore, limit our invention, except so far as it is limited by the terms of the appended claims, to anything shown and described.

Having thus described our invention, what we claim, and desire to secure by Letters Patent of the United States, is—

1. In a screen, the combination with a suitable supporting-frame; of an inclined screen-box supported thereby; a toggle connected to said screen-box and to a fixed part; means for throwing said toggle past its center to impart an intermittent movement to said screen-box; guides on said supporting-frame to confine the movements of the screen-box to a true vertical line and prevent lateral play thereof; and rigid stops to suddenly arrest the movements of the screen-box and cause a screening flow of the material; whereby "skipping" of the material over the screening-surface is avoided.

2. In a screen, the combination with a suitable supporting-frame; of an inclined screen-box; rigid supports forming pounding-blocks upon which said screen-box normally rests; means for securing said screen-box to said rigid supports, said means serving also to limit the vertical movements of said box and suddenly arrest such vertical movements; and a toggle for reciprocating said box and causing it to pound upon said rigid supports.

3. In a screen, the combination with a suitable supporting-frame; of an inclined screen-box; rigid supports forming pounding-blocks upon which said screen-box normally rests; securing-bolts to hold said box in position on said rigid supports and confine its movements to a vertical direction; adjustable stop-nuts on said bolts to limit the vertical movements of said screen-box; and a toggle for reciprocating said box and causing it to pound between said rigid supports and said limiting-nuts.

4. In a screen, the combination with a suitable supporting-frame; of an inclined screen-box; supporting-straps secured to the under side of said screen-box; said straps having outwardly-bent portions to form supporting-feet for the said screen-box; rigid supports forming pounding-blocks upon which said feet rest; bolts passing through said outwardly-bent straps to secure said screen-box to said rigid supports; said bolts allowing a limited vertical movement to said screen-box; and a toggle for reciprocating said screen-box and causing it to pound upon said rigid supports.

5. In a screen, the combination with a screen-box; of a plurality of screens therein; means for reciprocating said screen-box in a true vertical line to prevent "skipping" of the material over the screen; an independent feedway for each of said screens, a feeding-hopper movable over said feedways at right angles to the line of movement of said screen-box; and means for imparting a regular feeding movement to said hopper; so that it will deliver material to each of said screens in regular succession.

6. In a screen, the combination with a screen-box; of a plurality of superposed screens therein; independent feedways for said screens; means for reciprocating said screen-box in a true vertical line to prevent "skip-

ping" of the material over the screens; a hopper pivoted above said feedways; means for swinging said pivoted hopper over said feedways at right angles to the line of movement of said screen-box, so that it will deliver material to each of said screens in regular succession; and regulating-gates to control the mouths of said feedways and proportion the flow of material to the screens.

7. In a screen, the combination with an inclined screen-box; of a plurality of screens mounted therein; independent feedways for said screens; a hopper-box carried by said screen-box; a screen-feeding hopper in said hopper-box; means for moving said hopper over the mouths of said feedways with a regular feeding movement; and means for vertically reciprocating said screen-box.

8. In a screen, the combination with an inclined screen-box; of a plurality of screens mounted therein; independent feedways for said screens; a hopper-box carried by said screen-box; a screen-feeding hopper pivoted in said hopper-box above said feedways; means for imparting a regular swinging feeding movement to said hopper; and means for reciprocating said screen-box vertically.

9. In a screen and in combination; a vibrating screen-box; screens mounted therein; independent feedways for said screens; a hopper-box carried by said vibrating screen-box; a delivery-chute entering said hopper-box; a screen-feeding hopper pivoted in said hopper-box intermediate said delivery-chute and said screen-feedways; and means for swinging said hopper above said feedways so as to deliver material to each of said screens in turn.

10. The combination with a plurality of vertically-reciprocating screens; of means for vibrating said screens; a series of independent horizontally-arranged feedways for said screens; a horizontally-swinging hopper in feeding relation to said screens; and means for

giving a horizontal feeding swing to said hopper above the screen-feedways, so as to deliver material to each feedway at regular intervals.

11. In a screen, the combination with a single inclined screen-box; of means for vibrating said box; a plurality of superposed screens and screen-pans in said box; independent feedways for said screens; a pivoted feeding-hopper adapted to swing above said feedways and deliver material to each at regular intervals; and means for proportioning the flow through said feedways to the feeding intervals of the said hopper.

12. In a screen, the combination with an inclined screen-box; of a plurality of superposed screens in said box; independent feedways for said screens; means for vibrating said screen-box; a hopper-casing mounted on said screen-box over said feedways; a pivoted hopper mounted in said casing above said feedways; means for imparting regular swinging movements to said hopper, whereby it delivers to each feedway in turn; and a feed-chute delivering to said swinging hopper.

13. In a screen, the combination with a supporting-frame, of an inclined screen-box mounted thereon, a plurality of superposed screens in said box, screen-pans beneath said screens, toggle mechanism for vibrating said box, independent feedways for said screens, a single swinging hopper to deliver material to each of said feedways in turn, independent delivery-chutes for said screens and screen-pans, and inclined guide-plates for diverting the fines and tailings to opposite sides of the screen-box.

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

THOMAS LEGGETT STURTEVANT.

THOMAS J. STURTEVANT.

Witnesses:

P. B. MOURY,

LLOYD MAKEPEACE.