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2,653,714

HOLDDOWN DEVICE FOR SCREEN FRAMES

Filed Feb. 14, 1950

3 Sheets-Sheet 1

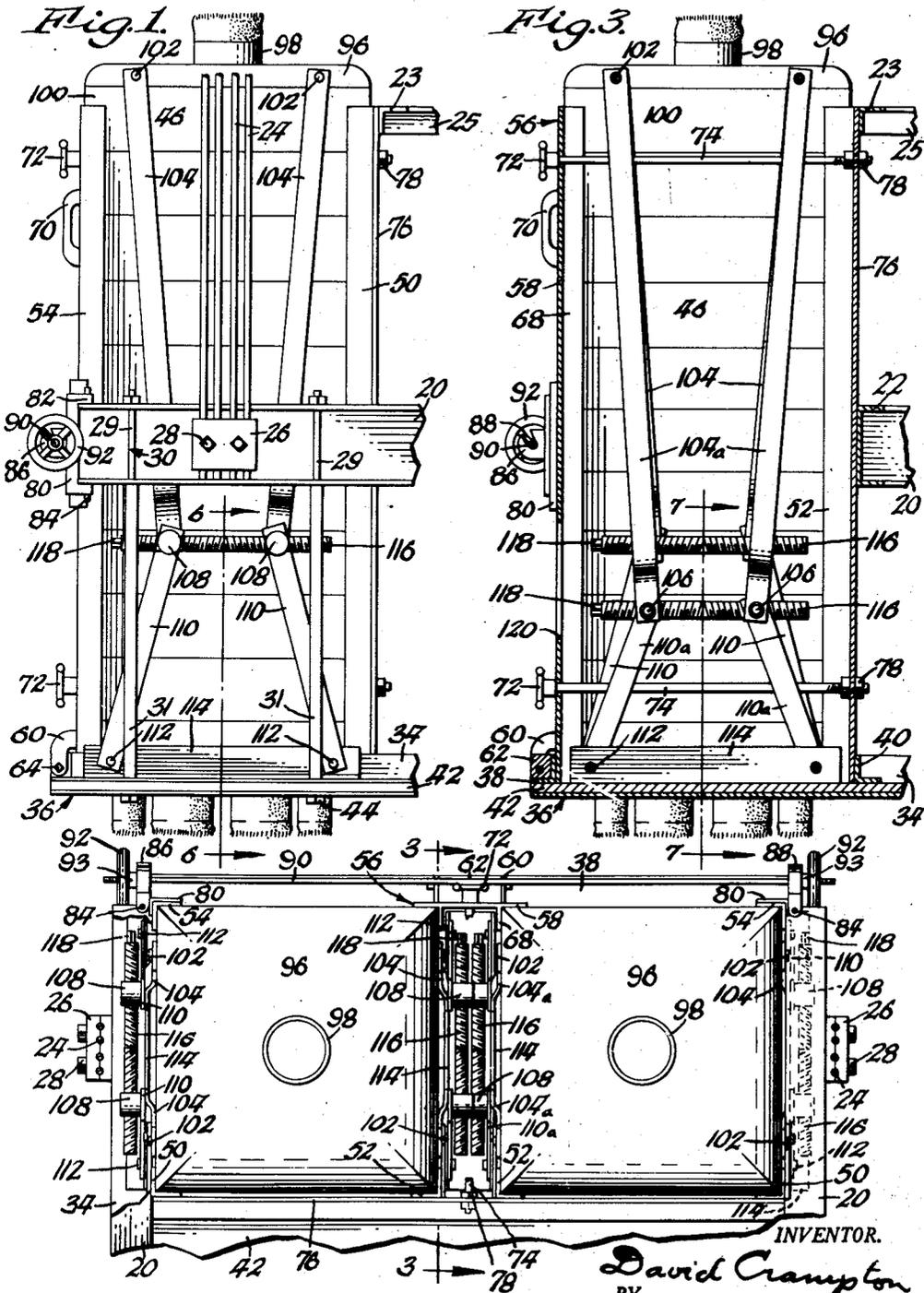


Fig. 2.

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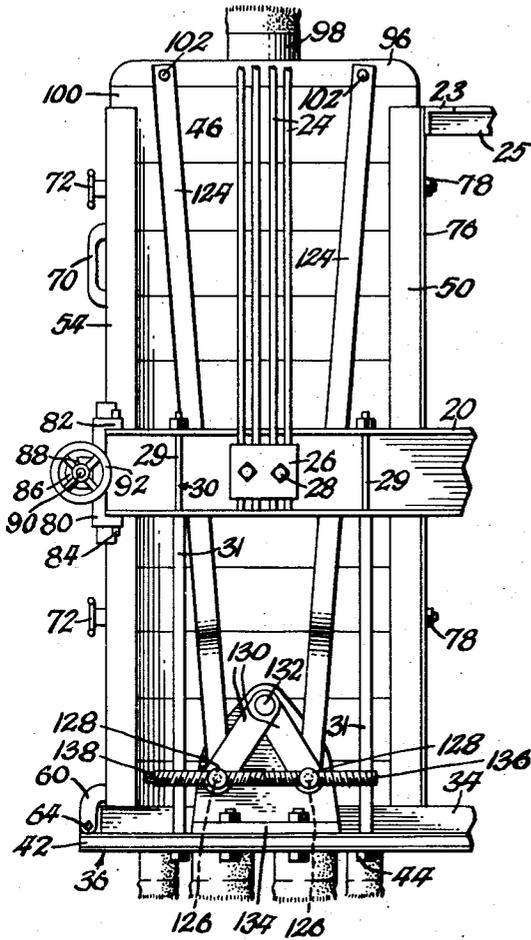


Fig. 8.

Fig. 7.

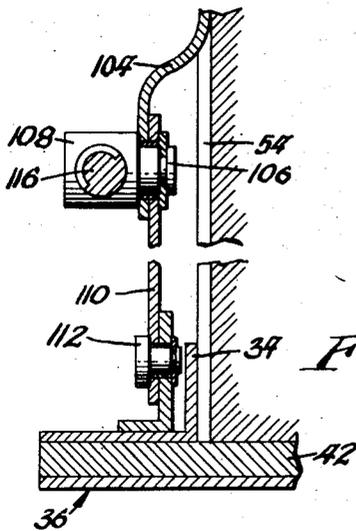
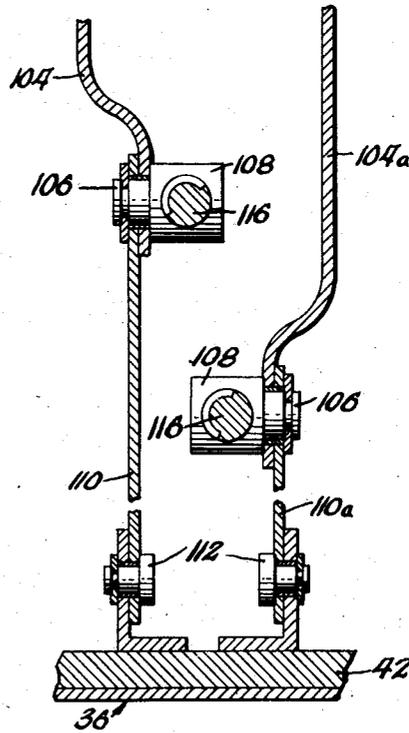


Fig. 6.

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HOLDDOWN DEVICE FOR SCREEN FRAMES

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Application February 14, 1950, Serial No. 144,090

7 Claims. (Cl. 209—319)

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This invention relates to sifters and particularly relates to an equalizing holddown for the stacks of sifters in which a plurality of stacks of superposed screens are mounted for high speed gyration as a unit.

It is an object of the present invention to provide a sifter of the type described with an improved mechanism for clamping the stacks of screen frames together and holding them securely down against the sifter frame.

Another object of the invention is to provide a sifter of the type described in which the clamping means for the stacks of screen frames is readily accessible and easily operated.

Another object of the invention is to provide means for raising the top frame or cover of each of the stacks of screen frames and supporting the top frame in an elevated position to permit replacement or substitution of screens.

Another object is to provide such a holddown in the nature of a linkage having a floating connection with an anchorage and capable of moving to exert an equalized pressure on the corners of the stack so that uniform clamping pressure is applied to the corners of the stack as a function of tightening the holddown.

Other objects and advantages of the present invention will appear from the following description and drawings in which:

Fig. 1 is a side elevational view of one end of a sifter having a holddown embodying the present invention.

Fig. 2 is a top plan view of the end of the sifter shown in Fig. 1.

Fig. 3 is a vertical sectional view on the line 3—3 of Fig. 2.

Fig. 4 is an end elevational view of the sifter shown in Fig. 1 with parts broken away to better show certain structure.

Fig. 5 is a fragmentary end elevational view showing the arrangement of the port or opening for providing access to the clamping device between the stacks of screen frames.

Fig. 6 is a fragmentary enlarged view showing in vertical section the details of the cover clamping mechanism used on the ends of the sifter; this section being taken on line 6—6 of Fig. 1.

Fig. 7 is a view similar to Fig. 6 showing details of the cover clamping mechanism used between stacks of screen frames, this section being taken on line 7—7 of Fig. 3.

Fig. 8 is a view similar to Fig. 1 and showing a modified form of the invention.

This application provides improvements in sifter constructions which are particularly useful

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with high-speed sifters of the type shown and described in the copending application of Peyton M. Thompson, Serial No. 562,753, for High Speed Sifters, filed November 10, 1944, now Patent #2,511,885, and the improvements have been illustrated as applied to a sifter of that type. The apparatus required for imparting gyratory circular motion to the sifter and a number of other details of sifter construction which are not pertinent to the present invention are not illustrated or described herein. It will be understood that the above mentioned application may be referred to for such details or that, if desired, any other suitable construction may be employed.

The body of the sifter embodying the present invention is shown as of generally square, box-like form and as carrying four stacks of screens, although it will be understood that the invention is applicable to sifters in which a greater or fewer number of stacks of screens are employed. Since the construction of the screen stacks is the same except for the necessary reversal of parts, the same reference numerals will be used to designate similar parts on the two stacks of screens shown in the drawings and on the frame.

The main supporting frame for the sifter of the present invention comprises a pair of horizontal channel beams 20 which are arranged on opposite sides of the sifter and are preferably disposed in a horizontal plane intersecting the center of gravity of the sifter. The channels of the beams 20 face outwardly and adjacent the center of the sifter are rigidly connected by a pair of horizontally spaced transverse channel beams 22, the ends of which are preferably welded to the side channel beams 20.

To support the main frame for the usual vibratory or gyratory motion in a horizontal plane, each of the ends of the longitudinal side channel beams 20 is supported by a plurality of vertically disposed wooden reeds 24. The upper ends of each group of these wooden reeds 24 are suitably anchored to the ceiling of the room in which the sifter is housed (not shown) or to other suitable supporting means. The lower ends of each group of reeds 24 are secured to the outer face of one of the longitudinal side channel beams 20 by a block and clamping plate 26 which are held in position and in clamping engagement by screws or bolts 28. As pointed out in the copending application above referred to, the connections between the reeds 24 and the main longitudinal side beams 20 of the frame should preferably be at places which lie in a plane intersecting the center of gravity of the sifter, for the reason that greater gyratory speed

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can be secured and vibration will be minimized.

At spaced intervals along each of the main longitudinal side channels 20 of the sifter frame the reduced upper ends 29 of depending tie rods 30 extend upwardly through the flanges of the beam 20 and are secured to nuts 32 supported on the upper flange of this beam with the shoulders separating the reduced ends 29 and lower portions 31 of the rods 30 in contact with the lower flanges of the beams 20. The lower ends of the tie rods 30 extend through the side angle bars 34 of a supporting platform frame 36. The frame 36 comprises the side angle bars 34, the end transverse angle bars 38 which connect the ends of the bars 34, and intermediate transverse angle bars 40 which connect the side angle bars 34 at places directly below the transverse channel beams 22 of the main frame of the sifter. The platform frame 36 and the platform 42 on the bottom side thereof are supported by nuts 44 at the lower ends of the vertical tie rods 30.

The platform 42, as shown in the drawings, carries at each end intermediate the reeds 24 and the channel beams 20 two stacks of screen frames 46. The inner construction of the screens in frames 46 is not a feature of the present invention. If desired, the screens may be like those shown and described in the copending application above referred to or they may be of any other construction suitable to sift, bolt, separate, screen, or grade the material being handled into different sizes. Holes in the bottom of the platform 42 provide communication with outlet spouts 48 through which the sifted or graded material is withdrawn.

Three of the corners of each stack of screen frames 46 are embraced by vertical angle bars 50, 52, and 54. The vertical angle bars 50 fit into the corresponding corners between the longitudinal channel beams 20 and the transverse channel beams 22 of the main frame of the sifter. The vertical angle bars 52 have their lower ends inside the transverse angle bar 40 of the platform frame and intermediate their lengths are preferably attached as by welding to the transverse channel beams 22 of the main sifter frame. At their upper ends the bars 52 are preferably attached to the transverse angle bars 23 which lie above and parallel to the beams 22 and bars 40 and which are connected at their ends by the longitudinal members 25. The bars 52 embrace, respectively the adjacent inside corners of the stacks of screen frames 46.

At the outside corners of the stacks of frames 46 which are adjacent to the corners of the platform 42 vertical angle bars 54 are provided, the bars 54 being arranged inside of the main longitudinal channel beams 20 and the platform frame angle bars 34 and 38. The angle bars 50, 52, and 54 may be secured in position by any suitable means. If desired the vertical bars 52 may be permanently fixed in position, as by bolting, welding, or rivetting, and the bars 50 can be adjustably moved toward these bars 52 to clamp the screen frames therebetween by the clamping means shown in the application above referred to.

A clamping plate 56 is pivotally mounted at each end of the platform 42. The member 56 comprises a flat face plate 58 which is provided adjacent its lower end with a pair of outwardly extending lugs 60 which are secured to a mounting block 62 by the hinge pin 64 and nut 66. The blocks 62 are preferably welded to the bars 38 of the platform frame 36. The face plate 56 has integrally attached thereto on the rear side there-

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of a pair of spaced inwardly extending flanges 68. The clamping member 56 is adapted to be swung around a horizontal axis on hinge pin 64. When in normal vertical position the member 56 has the face plate 58 overlapping and flush against the sides of the adjacent stacks of screen frames 46 with the inwardly extending flanges 68 serving to prevent sidewise displacement of the frame 46.

In effect, the clamping member 56 provides a pair of angle bars mounted on a single pivoted plate. The clamping member 56 is provided with a handle 70 and is held in vertical position by a plurality of wing nuts 72 which are secured on the threaded ends of the tie rods 74. The tie rods 74 are secured at their inner ends to a vertical plate 76 which extends transversely substantially the full width of the sifter and is secured to the transverse channel beam 22 and transverse angle bars 23 and 40 by welding or other suitable means. The tie rods 74 pass through the vertical plate 76 and are held thereto by nuts 78 screwed on the threaded ends of the tie rods on each side of the plate 76. Tightening of the wing nuts 72 on the tie rods 74 results in the face plate 58 exerting pressure on the corners of the screen frames 46 and drawing them into close engagement with the vertical angle bars 52. Since the sifter is subject to rapid gyratory motion it is essential that the screen frames 46 be firmly clamped in alignment. Clamping of the adjacent sides of the two stacks of frames carried at each end of the sifter is obtained by the clamping members 56 as above described.

To each end of each of the main longitudinal side beams 20 of the main frame of the sifter there is secured a clamping plate 80 which is L-shaped in horizontal section. Each of the L-shaped clamping plates 80 is provided with a pair of vertically spaced, outwardly extending ears 82 which are secured for pivotal movement to the outwardly extending flanges of the adjacent channel beam 20 by means such as a pivot pin or bolt 84. The clamping plates 80 can thus be swung to embrace the corners of the vertical angle bars 54.

Each clamping plate 80 is provided with a lug 86 which projects outwardly from the corresponding end of the sifter. Each of the lugs 80 is provided with an upwardly directed slot 88, the slots 88 in the two clamping plates 80 at each end of the sifter being in horizontal alignment and in the same vertical plane. A rod 90 threaded at both ends for the mounting of hand wheels 92 is received within the slots 88 with the hand wheels on the outer sides of the lugs 86. When the hand wheels 92 are turned on the screw threaded ends of the rod 90 the hubs 93 of said wheels are brought to bear against the lugs 86 and in pulling the lugs together cause the vertical angle bars 54 embraced by the clamping plates 80 to press against the corners of the screen frames 46 and thus to clamp the stack of frames securely between the vertical angle bars.

Although the screen frames 46 are clamped between the member 56 and the angle bars 50, 52 and 54 to prevent horizontal shifting with respect to platform 42, it is also necessary to hold the screen frames firmly down against the platform frame 36. By the present invention there is provided mechanism for securely clamping the screen frames 46 downwardly against the platform frame 36 by means attached to the top frame 96 with which each stack of screen frames is equipped.

Each of the top frames 96 is equipped with an inlet spout 98 in the top thereof through which the materials to be sifted or screened are admitted to the rectangular header 100 which is interposed between the top screen frame 46 in each stack and the top frame 96 and preferably projects upwardly above the tops of the angle bars 50, 52 and 54 and the clamping plates 53. The headers 100 provide receptacles within which the material to be sifted or screened collects and from which the material is fed to the series of screens below. If desired, the headers 100 and top frames 96 can be attached or made integral to constitute a unitary structure. On opposite sides of each of the top frames 96 adjacent the corners thereof there are provided pins 102 which extend horizontally outwardly therefrom with the pins 102 on one side of each cover projecting over side beams 20. Pivotaly mounted on the pins 102 and depending therefrom are elongated drawbars or tension members 104 and 104a, these drawbars being of identical construction except that the drawbars 104a are of somewhat greater length than the drawbars 104 so as to avoid interference.

At its lower end each of these drawbars is pivotaly secured to a pivot pin 106 projecting horizontally from a nut 108 these nuts forming independently floating members. Pivotaly mounted on these pins 106 and depending therefrom are another set of elongated tension members or drawbars 110, 110a, these drawbars being of identical construction except that the drawbars 110a are of shorter length and are associated with the longer drawbars 104a. The lower ends of the lower drawbars 110, 110a are secured to pivots 112 projecting horizontally from angle bars 114 which are suitably secured to the upper face of the platform 42. It will be noted that the pivots 112 are located outside of the downwardly projected centerlines of the tension members or bars 104.

The pair of nuts 108 at each side of each of the stacks 46 have axially aligned, reversely threaded bores and are connected by a horizontally disposed draw screw 116 which is threaded substantially throughout its length with the threads on one end thereof being directed oppositely from the threads on the other end. The outwardly facing ends of the draw screws 116 are provided with squared portions 118 which are adapted to be engaged by a key or socket wrench.

In order to provide access to the squared end portions 118 of the draw screws 116 arranged between the stacks 46 of sifter frames, an access opening 120 is provided in the clamping plate 55.

It is not essential that the members 110, 110a be tension members since these members can be under compression as illustrated in Fig. 8. Thus in this figure pivotaly mounted on the pins 102 are elongated drawbars 124, the lower end of each of which, as with the drawbars 104 in the form of the invention shown in Figs. 1-7, being pivotaly secured to a pivot pin 126 projecting horizontally from a nut 128. Pivotaly mounted on these pins 126 and extending upwardly therefrom are another set of links in the form of compression members or bars 130. The opposite ends of these compression members or bars 130 at each side of each stack are secured to a common pivot pin 132 which is located between the drawbars or tension members 124. Each of these pivots projects from the side of

an L-shaped bracket 134 having its other flange secured to the upper face of the platform 42. The pair of nuts 128 at each side of the stacks 46 have axially aligned, reversely threaded bores and are connected by a horizontally disposed draw screw 136 which is threaded substantially throughout its length with the threads at one end thereof being directed oppositely from the threads on the other end. The outwardly facing ends of the draw screws 136 are provided with squared portions 138 which are adapted to be engaged by a key or socket wrench.

In the following description, it will be assumed that the corners of each stack 46 of screens have been released from the angle bars 50, 52, 54 and 56. To release each stack from these angle bars the hand wheels 92 on the rod 90 are unscrewed sufficiently to permit this rod to be raised from the slots 88 in the lugs 86. The rod 90 is then removed and the clamping plates swung outwardly and back on the pivot pins or bolts 84. The angle bars 54 are then removed. The angle bars 50 are then removed from inward clamping engagement with the stacks of screens, this clamping mechanism not being shown. The wing nuts 72 are then unscrewed and the clamping plate swung outwardly and downwardly on the hinge pin 64. The sifter is then in condition for raising the top frames 46 through the mechanism embodying the present invention, it being understood that the reverse of the above operation is performed to reclamp the stacks 46 laterally by the angle bars 50, 52, 54 and 56.

It will be seen that the invention is essentially embodied in the holddown for the top frames 46 and comprises a pair of tension members, such as the drawbars 104 or 124, at the opposite sides of each stack 46 of screen frames and connected at their upper ends to the corners of the top frame of the stack, together with means constraining the lower ends of the pair of tension members to follow a downward path on being drawn together, in combination with a means, such as the nuts 118 or 128 and draw screws 116 or 136 for drawing the lower ends of these tension members together. In the form of the invention shown in Figs. 1-7, the guides for so constraining the tension members 104 to follow a downward path on being drawn together are the tension links or bars 110 which, by virtue of their pivots 112 being located outside of the downward projections of the centerlines of the tension bars 104, have their upper ends arranged to swing in a downward path on being drawn together and thereby effect a corresponding downward movement of the upper tension bars 104. In the form of the invention shown in Fig. 8, the guides for so constraining the tension members 124 to follow a downward path on being drawn together are the compression bars or members 130 which, by virtue of their common pivot 132 being located between the tension bars 124, have their lower ends arranged to swing in a downward path on being drawn together and thereby effect a corresponding downward movement of the tension bars 124.

It will particularly be noted that the holddown of the present invention serves to equalize the clamping pressures on the corners of the stacks by virtue of the floating connection of the nuts 108 through the bars 110, 110a with the bottom support 36 of the sifter. Thus assuming that, say, the upper right hand corner of the stack of screens frames as viewed in Fig. 1 is higher than the upper left hand corner, on turning the screw

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116 the nut 108 at the left would be drawn further toward the center of the stack than the nut 108 on the right and the screw 116, in the final position, would be at an angle to the horizontal, inclining downwardly toward its headed end. By virtue of this distortion of the linkage due to its floating anchorage, the holddown would apply the same downward pressure at the one corner as the other in spite of the fact that one corner is higher than the other, as assumed. Accordingly the holddown applies equalized clamping pressures to the corners of the top frames of the stack or stacks of screen frames.

Accordingly, in the form of the invention shown in Figs. 1-7, turning any draw screw 116 to draw its pair of draw nuts 108 together causes the upper ends of the corresponding pair of tension members or links 110 to swing toward each other and downwardly about their pivots 112. This causes a corresponding downward movement of the upper tension members or bars 104 thereby to draw the top frame 96 firmly down upon the corresponding stack 46 of screen frames. Conversely, when it is desired to lift the top frames 96, the draw screws 116 are turned to spread the nuts 108 thereby to swing the upper ends of the tension bars or members 110 about the pivots 112 upwardly and away from each other. This causes a corresponding upward movement of the upper tension members or bars 104 thereby to lift the top frames 96 and provide ready access to the individual screen frames in the stacks 46 thereunder.

In the form of the invention shown in Fig. 8, turning any draw screw 136 to draw its pair of draw nuts 128 together causes the upper ends of the corresponding pair of compression members or links 130 to swing toward each other and downwardly about their pivot 132. This causes a corresponding downward movement of the upper tension members or bars 124 thereby to draw the top frame 96 firmly down upon the corresponding stack 46 of screen frames. Conversely, when it is desired to lift the top frames 96, the draw screws 136 are turned to spread the nuts 130 thereby to swing the upper ends of the compression bars 130 about the common pivots 132 upwardly and away from each other. This causes a corresponding upward movement of the tension members or bars 124 thereby to lift the top frames 96 and provide ready access to the individual screen frames in the stacks 46 thereunder.

In the foregoing specification, there has been described one embodiment of the present invention as applied to a sieve of the general type shown and described in the said copending application, Serial No. 562,753. It will be understood, however, that the invention is capable of application to other sifter constructions and that modification to adapt the invention for such use is within the spirit of the present invention. It will be further understood that numerous modifications of the details of construction shown and described herein may be made without departing from the spirit of the invention. Accordingly, it is desired that the invention should not be limited by the foregoing description and the accompanying drawings, but is to be accorded the full range of equivalents comprehended by the accompanying claims.

I claim:

1. An equalizing holddown for a stack of screen frames mounted on a support and said stack having a top frame, comprising at least one pair of

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downwardly converging elongated tension members severally connected at their upper ends to the corners of said top frame to swing adjacent to and parallel with the side of said stack bounded by said corners and the lower end of each of said tension members being disposed closer to said support than to said top frame, a pair of independently floating members pivotally secured severally to the lower end of each of said tension members, a guide structure secured to said support below said pair of tension members, means movably connecting each of said independently floating members with said guide structure and constraining said independently floating members to move vertically relative to said support in response to movement thereof toward and from each other but permitting movement thereof relative to said support independently of each other, and a floating, manually operable screw means connecting said pair of independently floating members and arranged to positively move said independently floating members toward and from each other thereby to raise and lower said top frame and to apply equalized downward pressure at said corners of said top frame against said stack of screen frames.

2. An equalizing holddown for a stack of screen frames mounted on a support and said stack having a top frame, comprising at least one pair of downwardly converging elongated tension members severally connected at their upper ends to the corners of said top frame to swing adjacent to and parallel with the side of said stack bounded by said corners and the lower end of each of said tension members being disposed closer to said support than to said top frame, a pair of nuts movably secured severally to the lower end of each of said tension members to move about horizontal axes perpendicular to said side of said stack, each of said nuts being provided with a generally horizontal threaded bore arranged transversely of its said axis, means movably connecting each of said nuts with said guide structure and constraining said nuts to move vertically relative to said support in response to movement thereof toward and from each other but permitting movement thereof relative to said support independently of each other, and a floating, manually operable generally horizontal screw having its opposite ends screwed into said pair of nuts and formed to move said nuts horizontally toward and from each other thereby to raise and lower said top frame and to apply equalized downward pressure at said corners of said top frame against said stack of screen frames.

3. An equalizing holddown for two closely spaced parallel stacks of rectangular screen frames mounted on a common support and each of said stacks having a top frame, comprising a tension bar connected at its upper end to each of the four corners of each of said top frames to swing parallel with the space between said stacks and the lower end of each of said tension bars being disposed closer to said support than to said top frame, two pairs of said tension bars being arranged in said space with each pair close to the side of a corresponding stack and the other two pairs being each arranged close to the face of the corresponding stack opposite said space, a nut movably secured to the lower end of each of said tension bars, a plurality of guides mounted on said support severally below and projecting upwardly toward a corresponding pair of said tension bars, means operatively connecting each of said guides with a corresponding pair of said

nuts and constraining each pair of said nuts to move both upwardly and downwardly relative to said support independently of one another in response to horizontal movement of each pair of nuts toward and from each other, and four manually operable generally horizontal screw members arranged parallel with the space between said stacks and each having opposite ends operatively connected with the corresponding pair of nuts to move said pair of nuts horizontally toward and from each other thereby to raise and lower each top frame relative to its stack and to apply equalized downward pressures at said corners of said top frames against said stacks of screen frames.

4. An equalizing holddown for two closely spaced parallel stacks of rectangular screen frames mounted on a common support and each of said stacks having a top frame, comprising a tension bar connected at its upper end to each of the four corners of each of said top frames to swing parallel with the space between said stacks and the lower end of each of said tension bars being disposed closer to said support than to said top frame, two pairs of said tension bars being arranged in said space with each pair close to the side of a corresponding stack and the other two pairs being each arranged close to the face of the corresponding stack opposite said space, a nut removably secured to the lower end of each of said tension bars, eight bars each associated with and being substantially shorter than a companion tension bar, a pivot connection between one end of each of said shorter bars and a companion nut, a second pivot connection between the other end of each of said shorter bars and said support and located in vertically spaced relation to the companion first pivot connection, each pair of said second pivotal connections being located intermediate the companion pair of said first pivot connections whereby each pair of said nuts is constrained to move both upwardly and downwardly relative to said support independently of one another in response to horizontal movement of each pair of said nuts toward and from each other, and four manually operable generally horizontal screw members arranged parallel with the space between said stacks and each having opposite ends operatively connected with the corresponding pair of nuts to move said pair of threaded nuts horizontally toward and from each other thereby to raise and lower each top frame relative to its stack and to apply equalized downward pressures at said corners of said top frames against said stacks of screen frames.

5. A structure as set forth in claim 4 wherein said second pivot connection is arranged below said companion first pivot connection.

6. A structure as set forth in claim 4 wherein

said second pivot connection is arranged above said companion first pivot connection.

7. An equalizing holddown for the adjacent corners of two closely spaced parallel stacks of rectangular screen frames mounted on a common support and each of said stacks having a top frame, comprising a tension bar connected at its upper end to each of the adjacent corners of said top frames to swing parallel with the space between said stacks and the lower end of each of said tension bars being disposed closer to said support than to said top frames; two pairs of said tension bars being thereby arranged in said space with each pair close to the side of a corresponding stack, a nut movably secured to the lower end of each of said tension bars, at least one guide structure mounted in said space on said support and projecting upwardly toward said pairs of tension bars, means operatively connecting said guide structure with said pairs of nuts and constraining each pair of said nuts to move both upwardly and downwardly relative to said support independently of one another in response to horizontal movement of each pair of said nuts toward and from each other, and a pair of manually operable generally horizontal screw members arranged in and parallel with the space between said stacks and each having opposite ends operatively connected with the corresponding pair of nuts to move said pair of nuts horizontally toward and from each other thereby to raise and lower the corresponding top frame relative to its stack and to apply equalized downward pressures at said corners of said top frames against said stacks of screen frames.

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