United States Patent

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[72] Inventor **Edgar P. Symons**
Hollywood, Calif.

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[73] Assignee **Symons Brothers Co.**
North Hollywood, Calif.

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[54] **SCREEN-CLOTH-SECURING MEANS**
7 Claims, 3 Drawing Figs.

[52] **U.S. Cl.** **209/405,** 209/414
[51] **Int. Cl.** **B07b 1/46**
[50] **Field of Search** 209/403, 404, 405, 408, 319, 409, 414

[56] **References Cited**

UNITED STATES PATENTS

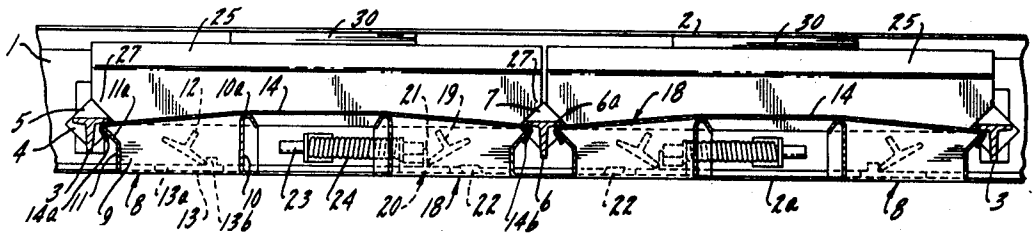
2,090,767	8/1937	Sayers	209/403 X
2,374,775	5/1945	Parks	209/403 X
3,101,314	8/1963	Johnson	209/403 X

FOREIGN PATENTS

1,133,224	7/1962	Germany	209/403

Primary Examiner—Frank W. Lutter
Assistant Examiner—William Cuchlinski, Jr.
Attorney—Parker, Carter & Markey

ABSTRACT: A screen-cloth-tensioning device in which cloth is tensioned, and in which the operator can work within the periphery of the screen in applying or removing tensioned screen cloth, so that it is possible to work down through a multideck screen structure, the work being done primarily within the periphery of the screen.



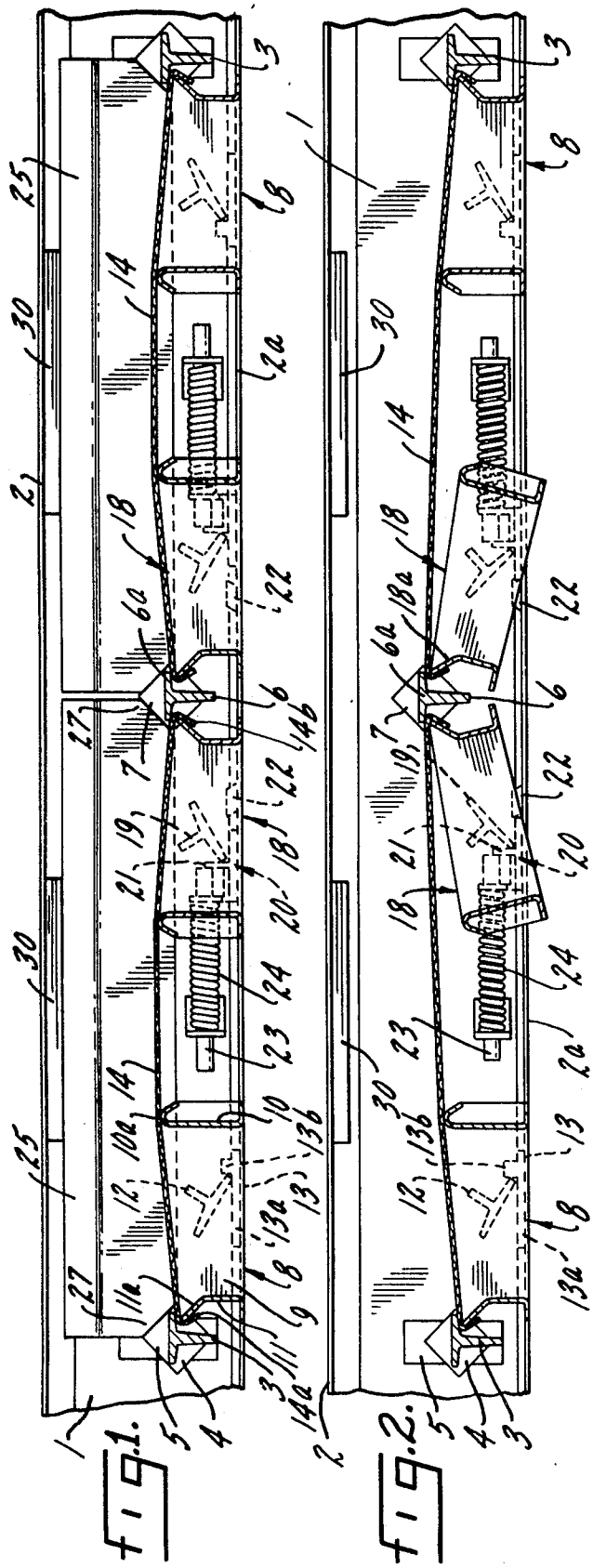


FIG. 1.

FIG. 2.

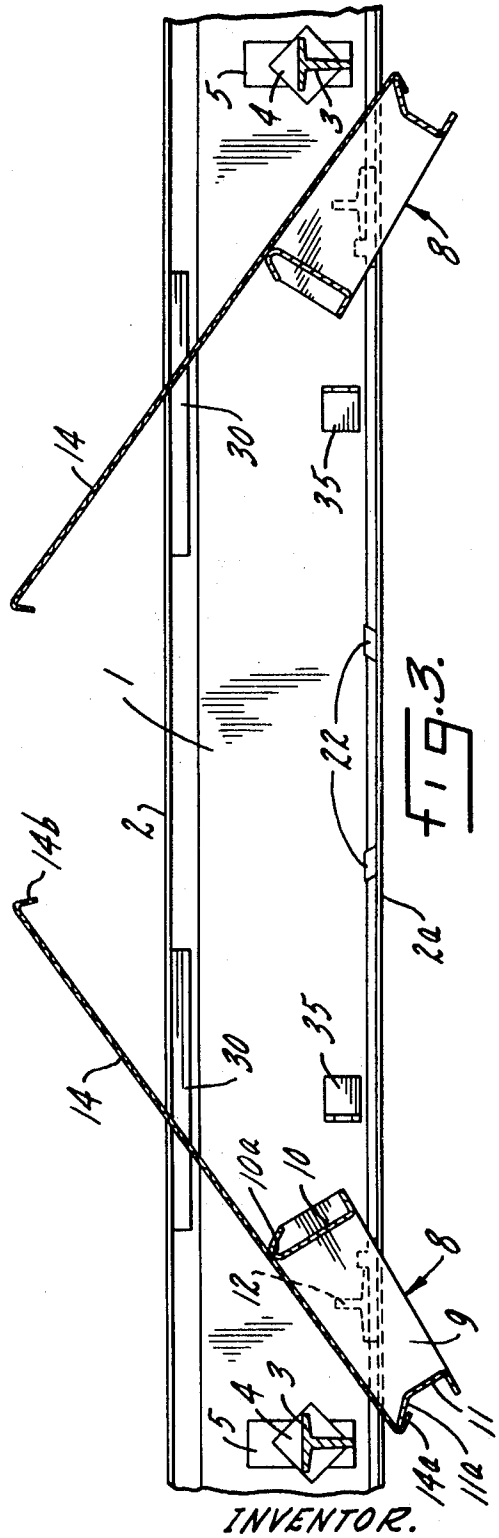


FIG. 3.

INVENTOR.
Edgar P. Symons
BY Parker, Carter & Markey
Attorneys.

SCREEN-CLOTH-SECURING MEANS

SUMMARY OF THE INVENTION

This invention is in the field of screens in which screen cloth is clamped and tensioned in position to receive rock, ore, or the like, to separate material fragments or particles by sizes. The invention concerns particularly the tensioning of screen cloth in which the tensioning operation for applying or removing cloth may be handled within the periphery of the screen, whereby external access to the sides of the screen becomes unnecessary.

A primary object is to provide a method and means for applying, removing, and replacing tensioned screen cloth in screens, including multideck screens.

Another object is to make unnecessary, during the application, or removal, or replacement of screen cloth in screens, any access from points laterally exterior to the screen.

Another purpose is to provide a simple and efficient means and method for tensioning screen cloth, and, for example, for longitudinally tensioning the screen cloth.

Other purposes will appear from time to time in the course of the specification and drawings.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is a longitudinal cross section of the screen, with parts in elevation, illustrating a single screen deck with the screen cloth longitudinally tensioned therein;

FIG. 2 is a similar longitudinal section illustrating a stage in the application or removal of the screen cloth; and

FIG. 3 is a similar longitudinal section illustrating an initial stage in the application of screen cloth.

Like parts are indicated by like symbols throughout the specification and drawings. It is understood that where I use the term "screen cloth" I wish it to be interpreted broadly enough to cover any separating medium available for use in such screens.

DESCRIPTION OF THE PREFERRED EMBODIMENT

1 indicates a screen side frame member, the details of which do not of themselves form a part of the present invention. It will be understood that such a side frame member is located along each side of the screen and that the side frame members are suitably connected transversely to provide a complete screen frame. 2 indicates an inwardly extending top flange, and 2*a* an inwardly extending bottom flange. I may, as a matter of convenience, use a channel member for the side frame, but the frame details may be varied without departing from the invention.

3 indicates a fixed transverse member which, for convenience, is shown in the form of a T. It has end abutments 4, which may be suitably secured to the side frame members, for example, by end abutment plates 5. It will be understood that the transverse member 3 is normally fixed in position, and forms part of the fixed screen-frame structure. In the partial showing of a screen deck of the present drawings one of the transverse members 3 is shown at each end of the illustrated portion. Between the fixed transverse members 3 is a vertically movable transverse member 6, which also includes end plates 7. It will be understood that it may be guided for vertical movement in any suitable way, it being shown in its operating position in FIG. 1 and in an upward position in FIG. 2.

8 generally indicates a tranversely extending subframe which has side members 9, a transverse end member 10, with a recurved upper portion 10*a*, and a member 11 shown as having an outwardly inclined upper portion 11*a*. Secured to the outer surfaces of the side members 9 are any suitable pivot abutments, indicated as 12.

Mounted on the bottom flange 2*a* of the side frame members 1 is a fixed pivot seat, generally indicated as 13. It may have a bottom plate 13*a* with an upward extension 13*b* adapted to engage one side of the subframe pivot abutment 12. Thus when the screen-cloth-engaging subframe 8 is initially put into position, the pivot abutments 12 may rest upon

pivot seat 13. The initial position is illustrated in FIG. 3. It will be understood that when the subframes 8 have been rotated or tilted into their final position, as shown in FIGS. 1 and 2, the pivot abutments 12 will bear against 13*a* and 13*b*. Thus the subframe 8 may pivot in pivot seat 13 and be readily upwardly removed.

In applying the screen cloth, the cloth 14, with its lower hooked edge 14*a*, may be hooked about the portion 11*a* of the member 11, an intermediate part of the screen cloth 14 resting upon the rounded portion 10*a* of the member 10. The second subframe 18 may then be applied. For convenience, it may be identical with the subframe 8 but is applied in reverse, in that the outwardly inclined portion 18*a* receives the hooked portion or terminal portion 14*b* of the screen cloth 14. The pivot abutments 19 of the subframe 18 may pivot against a movable pivot seat, generally indicated as 20. This movable pivot seat, with its upward projection 21, may slide along the lower flange 2*a* of the side frame member 1. A spring-thrust plunger 23 directs its thrust against the movable pivot seat 20, biasing it against the fixed stop 22. The spring 24 is effective, in the position of the parts shown in FIG. 2, to thrust the subframe 18, and with it the member 18*a*, away from the opposite end of the screen cloth. The vertically movable transverse member 6 may then be applied, and downwardly thrust, and may be positioned as shown in FIG. 2, in which the branch 6*a* of the T 6 overlies two adjacent screen cloth edges, both being hooked on one of the subframes 18. The operator may use any suitable jack means, the details of which are not herein shown, in order to thrust the vertically movable transverse members 6 down into the position in which they are shown in FIG. 1. At that position the movable pivot seats 20, have been moved against the compression of the springs 24 in such fashion as to be spaced from the fixed stops 22.

To keep the parts in the position shown I prefer to apply sideplates 25, each of which has lower corner portions 27 adapted to abut the edges of the plates 4 and 7 as shown in FIG. 1. The plates 25 may be positioned under suitable side frame abutments 30 or under the inwardly extending top flange 2. The plates 25 preferably are formed to extend inwardly and downwardly from the abutment 30, etc., which engage their upper edges, and will receive whatever thrust is provided by the springs 24, which tend to rotate the screen cloth and the members 18 from the position of FIG. 1 toward the position of FIG. 2. The sideplates 25 thus position and lock the entire screen-cloth-tensioning assembly in the position of FIG. 1 and also provide removable and replaceable side members which confine the material to the cloth surface. When the screen is in use the parts are in the position in which they are shown in FIG. 1, with the member 7 upwardly thrusting against the angles 27 of two adjacent sideplates 25, and tending to thrust them longitudinally against the abutment plates 5 of the fixed transverse members 3.

It will be understood that the side frame members 1 carry not only the upper flanges 2 and the lower flange 2*a*, but the fixed pivot seats 13, fixed stop 22 and the abutments 35 through which pass the spring-thrust plungers 23 and against which thrust the outer ends of the springs 24. The crossmembers 3 and 6 may be similar, except that the crossmember 6 is upwardly and downwardly movable, whereas the crossmembers 3 are normally fixed. The subframe members 8 and 18 may be identical, but are merely reversed in their position of application.

It will be understood that in applying new screen cloth the subframe 8 can be dropped into the position shown in FIG. 3 with the pivot abutments 12 being supported by the fixed pivot seat 13 secured to the lower flanges 2*a* of the side frame members 1. The cloth 14 is then hooked over the edge 11*a* and rests on the portion 10*a* of the member 10. The second subframe 18 may then be hooked into the position in which it is shown in FIG. 2. The subframe 18 and the screen cloth may then be moved pivotally into the position of FIG. 2, in which position the compression of the spring 24 is effective to thrust the movable pivot seat 20 against the fixed stops 22. All that

then remains to be done is to thrust the member 6 downwardly into its FIG. 1 position, or slightly below it, and to insert the sideplates 25. Any suitable jack means may be employed for exerting a downward thrust against the member 6, such jack means forming, per se, no part of the present invention. It is, however, convenient to have a jack base which spans and engages the side frame members, and which has any suitable jack members or elements on it which operate downwardly against the vertically movable transverse members 6.

In releasing the device all that is necessary is to jack down against the member 6 sufficiently to permit the removal of the sideplates 25. They can simply be moved inward from under the abutments 30 and upwardly removed. The parts are then returned to the general position of FIG. 2, and the screen subframes 18 can then be readily rotated further in the movable pivot seat 20 to release the screen cloth and to permit the application of a replacement cloth.

My invention is particularly important in connection with multideck screens, and screens used in a restricted area or which are surrounded by housings. All the work may be done from above, and within the periphery of the screen section to be replaced. It is quite common to have screens with four or five decks, or more. Where the screen is housed within a closed housing any suitable hatch covers, not shown, may be employed. When these are removed from above a particular screen cloth area then the operator may go down through the hatch and have access to the particular screen cloth portion he wishes to remove. He then uses a suitable jack, thrusts down against the vertically movable transverse member 6, removes the sideplates 25, rotates and eventually removes the transverse subframes 18, which leaves the parts in the position shown in FIG. 3. Thereupon it is easy to remove the cloth 14 and apply a replacement, and then reverse the above procedure.

While I have shown and described a preferred form of the invention, it should be understood that suitable changes, modifications, alterations and substitutions may be made without departing from the spirit of the invention. I therefore request that the invention be unrestricted except as required by the prior art.

The use and operation of the invention are as follows:

In late years it has been increasingly customary to employ vibrating screens having a plurality of decks. Four or five decks are not uncommon. The vibrating mechanisms of such screens form no part of the present invention and are not herein described. It will be understood, for example, that it is quite common to vibrate screens longitudinally, by suitable vibratory mechanisms, which may, for example, be constituted by rotating unbalanced members having generally horizontal axes at right angles to the screen. It has likewise, of late, become customary in some industries to house such screens in housings which surround the vibrating screen and its multiple decks. Material may be fed into such a housing on an upper portion thereof, to be delivered to the feed-receiving end of the screen. Material passes along and through the various decks and is removed, in a plurality of classifications, by means which do not form part of the present invention. In so-called "hot plants" used in roadwork the screen may be completely housed with a closed upper housing wall. This wall may be provided with hatches or openings, which may, for example, be closed be removable covers. The screen cloth or screening medium of the various decks may be tensioned by a variety of means. I prefer, however, to employ a series of screen cloth panels, as shown in the drawings, which are tensioned longitudinally of the screen. Screens may be of substantial length, and, whereas the drawings show two such screen cloth panels, it will be understood that a considerably larger number of such panels may, under some circumstances, be used.

Assume that a hatch or opening is provided in the upper wall of the housing so that the operator may have access from above to the various screen cloth panels. Upon the removal of the hatch cover, which may be positioned elsewhere upon the housing top, the operator then has access from above to a full screen cloth panel, or to two adjacent screen panels. He may then position a jack transversely across the deck, in any suitable manner, and apply the jack to thrust downwardly against the vertically movable transverse member 6. The access opening might, for example, be positioned or centered above the vertically movable transverse member 6, but provides sufficient access space so that the operator, from above, can insert or remove the sideplates 25 from two adjacent panels. Assume that he wishes to have access to screen cloth panels in a lower deck. He simply removes the sideplates from each of the upper decks, successively, and temporarily removes screen panels 14 to give access to the lower decks. The screen-tensioning subframes 8 and 18 may readily be upwardly removed and stacked in the top of the screen housing. The operator may quickly remove the screen panels from those decks which are above the deck to which he wishes operating access. When the deck in which screen panels are to be replaced has been reached the operator can quickly complete the task as above described. Thereafter, he successively returns the upper screen panels or units to the position in which they are shown in FIG. 1, and then replaces the housing cover. Thus, an operator, without access to the side of the screen, and without removing the screen from the housing, may quickly and conveniently go down through all of the decks to have access to any and all screen panels which he wishes to replace.

Since "downtime" of a screen is an important factor in the efficiency of the screen, and in the volume produced thereby, the reduction in downtime obtained by the above procedure is one of the greatest importance. The screen itself does not have to be dismantled. The housing does not have to be removed from about the screen. The screen does not have to be removed from the housing. Normally, lateral access to the screen is needed. The only parts which have to be removed are the simple subframes 8 and 18, and the screen units or cloth 14 which are tensioned thereby. Whereas the subframes 8 and 18, in their respective positions, perform a different function, they are structurally interchangeable. The screen user, therefore, needs only one type of subframe.

The sideplates 25 not merely maintain the tensioning structure in the position of FIG. 1; they serve to define or bound the space along which the material being screened passes. They prevent the undersired lateral escape of material undergoing screening.

I claim:

1. For use in a screen frame having transversely connected side members, a screen cloth-tensioning assembly including vertically movable transverse members interposed between fixed transverse members, and movable screen-cloth-receiving subframes positioned between the side frame members, each subframe being freely movable in relation to and upwardly removable from the screen frame, each subframe having a pivotal connection with the screen frame, such pivotal connections being constituted by pivot abutments extending beyond the ends of each subframe, and pivot seats mounted on the side frame members to receive the pivot abutments of the subframes, there being a subframe member having a screen-cloth-receiving edge adjacent to and beneath a branch of each of the fixed transverse members, and other subframes having screen-cloth-receiving edges opposable to and beneath a branch of the vertically movable transverse members, there being a pair of subframes between each of the fixed transverse members and the adjacent vertically movable transverse members, panels of screen cloth having ends adapted to be hooked over the edges of each such pair of subframes, with one such end portion beneath a branch of a fixed transverse member, and one beneath a branch of a vertically movable transverse member, the pivot seats for the subframes adjacent to the vertically movable transverse members being movable longitudinally along the side frame members, yielding means tending to urge the movable pivot seats toward the vertically movable transverse members, and fixed stops to limit the movement of the pivot seats, and removable sideplates positioned within the

side frame members, each sideplate having its upper edge bearing against a side frame member and its lower edge against the transverse members, said sideplates holding the vertically movable transverse members down in operating position with the screen cloth under tension, and confining the material flow to the screen cloth.

2. The structure of claim 1 characterized in that for each screen cloth panel two subframes are employed, these being substantially indentical but placed between the side frame members in reverse relationship, whereby for each cloth panel one subframe edge opposes a fixed transverse member and the corresponding opposite subframe edge opposes the vertically movable transverse member.

3. The structure of claim 1 characterized in that when the screen-tensioning structure is in operating position with the sideplates in place the yielding means is effective to tension the screen cloth, the thrust of the yielding means and the tension in the screen cloth being effective to hold the sideplates, the vertically movable transverse members, the subframes and the screen cloth securely against movement with respect to the side frame members, thereby assuring that the entire screen-cloth-tensioning device will move in unison with the side frame members when the screen is in operation.

4. For use in a screen frame having transversely connected side frame members, a screen-cloth-tensioning assembly including fixed transverse members and vertically movable transverse members, a vertically movable transverse member being interposed between the fixed transverse members, panels of screen cloth positioned between each fixed transverse member and an adjacent vertically movable transverse member with one end of each screen cloth panel beneath a branch of a fixed transverse member and the other end beneath a branch of a vertically movable transverse member, means for tensioning the screen cloth by downward movement of the vertically movable transverse member, and means for maintaining the screen cloth under tension during operation.

5. The structure of claim 4 characterized in that the means for holding the screen cloth panels tensioned during use is constituted by sideplates clamped between the side frame members and the transverse members, with the upper edges held by the side frame members and their lower edges abutting the transverse members.

6. A screen-tensioning mechanism comprising a cloth-supporting subframe having pivotal abutments extending beyond its sides that are supported by pivot seats within a main screening frame, springs adapted to urge the pivot seats and the subframe pivotal abutments in a longitudinal direction, a screening cloth secured to the side frame members at one end and hooked over the subframe at the other end when the subframe is at an angle with its normal longitudinal position, means for tensioning the screening cloth when the screen cloth and subframe are moved into a generally longitudinal position by applying spring force against the subframe pivot abutments, and further means for securing the subframe and screening cloth in its normal longitudinal operating position.

7. The structure of claim 6 characterized by the provision of a vertically movable transverse member effective when downwardly moved, to move two adjacent subframes into their generally longitudinal position, thereby simultaneously tensioning two adjacent screen cloth panels.