Aug. 11, 1959 J. J. SCHROTH 2,899,061

VIBRATING SCREEN

Filed Aug. 8, 1958 2 Sheets-Sheet 1

Fig. 1.

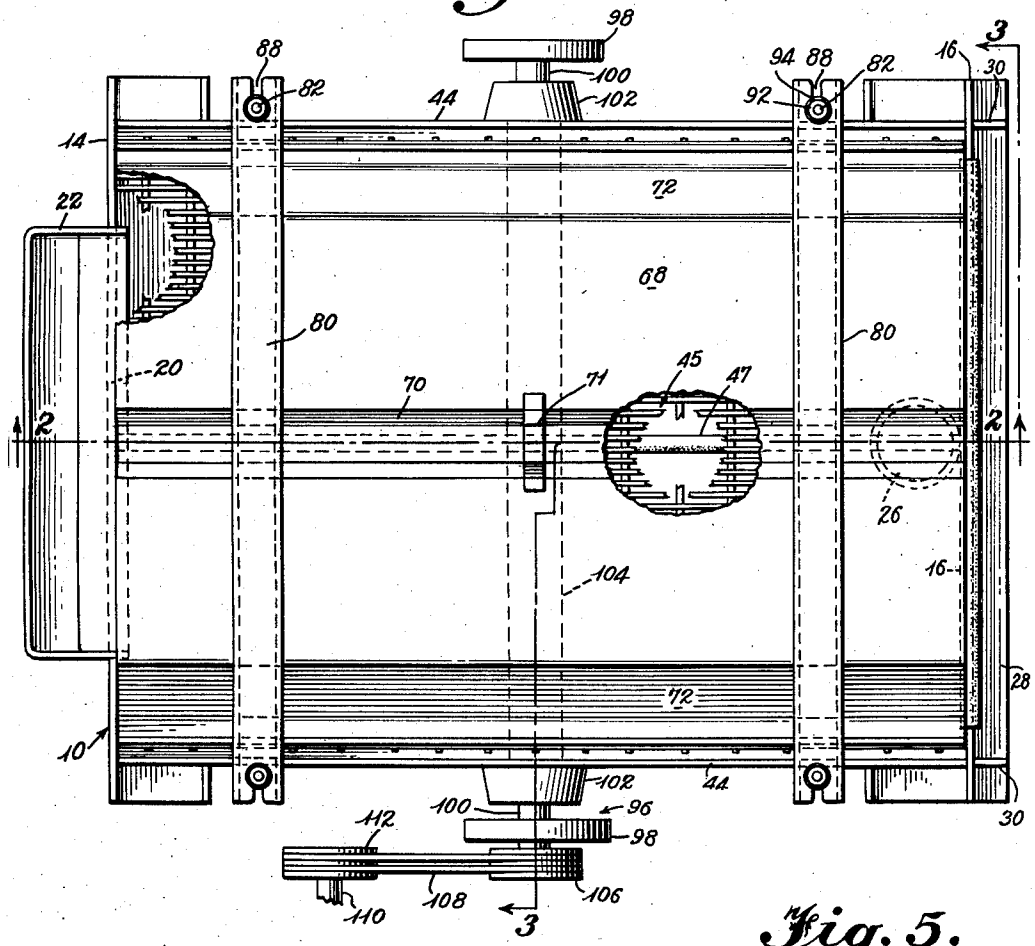


Fig. 4.

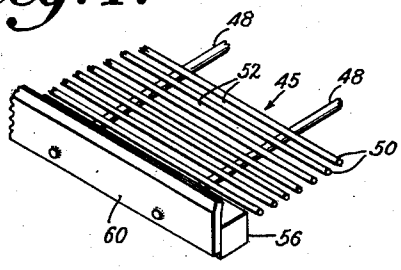
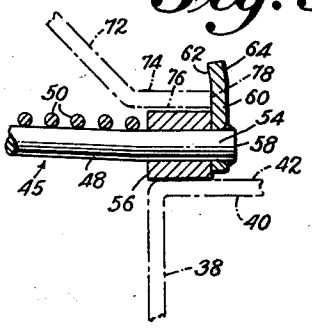


Fig. 5.



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Fig. 2.

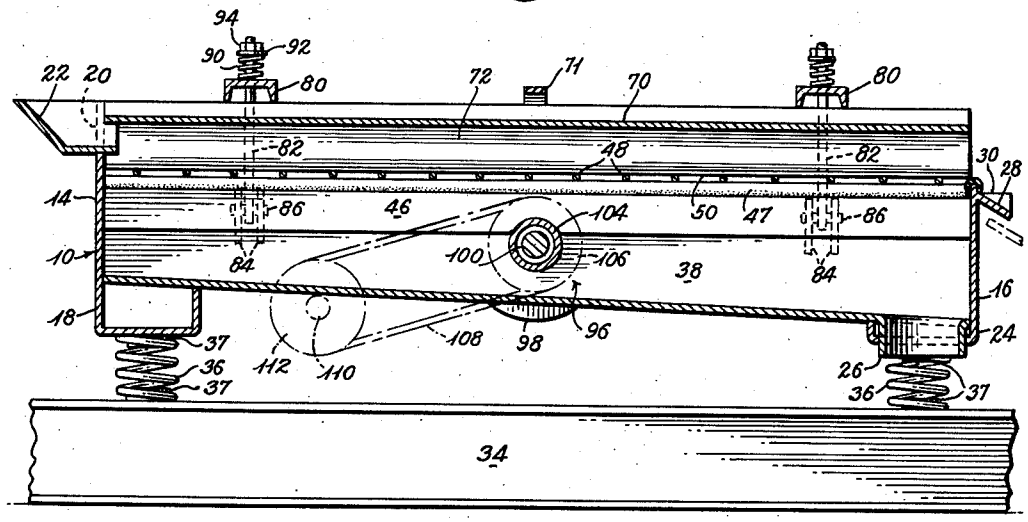
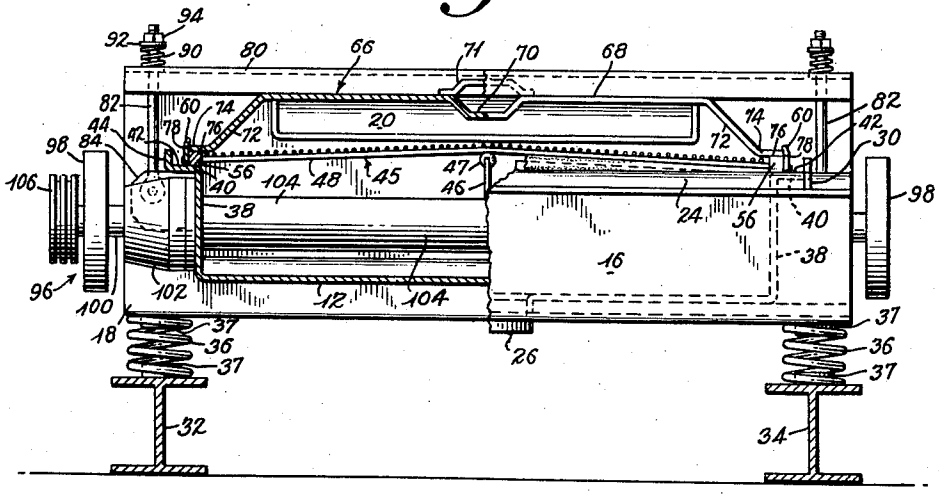


Fig. 3.



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2,899,061

VIBRATING SCREEN

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Application August 8, 1958, Serial No. 753,910

5 Claims. (Cl. 209—408)

This invention relates to new and useful improvements in vibrating screens, and deals more particularly with means for securing a screen panel to the box of a vibrating screen assembly.

An object of this invention is to provide a rigid screen panel which is detachably secured to a screen box by easily operated means facilitating rapid installation and removal of the panel.

Another object of this invention is to provide improved structure for clamping a substantially rigid panel to a screen box, which structure, in addition to performing the clamping function, encloses the upper surface of the panel to prevent contamination from external sources of the material being screened and/or to confine dust particles and the like raised by the screening operation.

A further object of this invention is to provide a substantially rigid screen panel having a particular longitudinal edge construction which cooperates with a cover and clamp member to resiliently mount the panel in the box of a vibrating screen assembly.

Other objects and advantages of the invention will be apparent during the course of the following description.

In the accompanying drawings forming a part of this specification and in which like numerals are employed to designate like parts throughout the same,

Figure 1 is a top plan view of a vibrating screen assembly embodying the present invention, certain parts being broken away to more clearly illustrate structural details;

Figure 2 is a vertical sectional view of the screen assembly taken on line 2—2 of Fig. 1;

Figure 3 is a vertical sectional view of the screen assembly taken on lines 3—3 of Fig. 1;

Figure 4 is a fragmentary perspective view showing certain structural details of the screen panel employed in the assembly of Fig. 1, and;

Figure 5 is a fragmentary sectional view showing further structural details of the screen panel of Fig. 1 and the manner in which it is mounted in the assembly.

In the drawings, wherein for the purpose of illustration is shown a preferred embodiment of this invention, the form of vibrating screen assembly disclosed includes a screen box **10** having a substantially flat bottom member **12** which slopes downwardly toward the discharge end of the assembly, as viewed in Fig. 2.

The opposite ends of the box **10** are closed by a feed end plate **14** and a discharge end plate **16**. Each of the plates **14** and **16** is secured by suitable means, such as welding, to the respective ends of the box **10**. As best seen in Fig. 2, the lower portion of the feed end plate **14** is bent inwardly and upwardly to define a transversely

extending channel **18** which reinforces the feed end of the box **10**. A materials receiving cut-out **20** is formed in the upper portion of the plate **14** through which material is fed into the interior of the screen assembly. A receiving spout **22** of any suitable construction may be mounted upon the plate **14**, as by welding.

The discharge end plate **16** is likewise formed with an inwardly and upwardly bent portion which defines a reinforcing channel **24** for the discharge end of the box **10**. As best seen in Fig. 2, the channel **24** is interrupted in its central portion to provide an opening from the edge of which a discharge spout **26** may depend for emptying the interior of the box **10**. A transverse discharge lip **28** extends across the upper edge of the plate **16** and has a pair of spaced deflector elements **30** located to confine material flowing from the screening surface.

The screen box **10** is resiliently supported upon a pair of fixed frame elements **32** and **34** by coil springs **36** which are mounted at each end of the respective channels **18** and **24**. The springs **36** may be maintained in position by piloting lugs **37** secured to the associated frame members and channels.

According to the invention, the screen box **10** includes a pair of laterally spaced side wall members **38** which extend longitudinally of the screen assembly from the feed end plate **14** to the discharge end plate **16**, to which they may be secured by welding, or other suitable means. The lower portions of the side wall members **38** are connected to or integral with the lateral edges of the bottom member **12**, while the upper portions thereof are bent laterally outwardly to form generally horizontal flanges **40** running along the entire length of the screen box and providing upwardly facing bearing surfaces **42**, as best seen in Fig. 3. The laterally outer portion of each flange **40** may in addition be bent to form an upstanding guide flange **44** which also runs the entire length of the screen box.

The actual screen or deck element in the present instance comprises a substantially rigid screen panel **45** which spans the side wall members **38** and extends longitudinally of the assembly from the feed end plate **14** to the discharge end plate **16**. The bearing surfaces **42** provide a support for the side edges of the screen panel **45** in a manner hereinafter described, while additional support may be provided for the central portion of the panel by an upstanding slat **46** centrally located between the side wall members **38** and extending from the feed end plate **14** to the discharge end plate **16** to which it may be attached as by welding. The top edge of the slat **46** may be covered with a strip **47** of resilient material which engages the lower surface of the screen panel, as shown in Fig. 3.

The screen panel **45** shown is especially adapted for dewatering or separating liquids and solids but may be used for sizing dry materials and comprises a plurality of transversely extending stringers **48**, which may take the shape of round rods, longitudinally spaced along the length of the screen box **10**. Across the tops of the stringers **48**, and conected thereto, are a plurality of screen rods **50** which are spaced laterally of the screen box **10** and which extend longitudinally thereof from the feed end plate **14** to the discharge plate **16**. Referring to Fig. 4, it will be noted that this arrangement of the stringers **48**, and connected thereto, are a plurality of

panel 45 with a plurality of rectangular openings 52 through which particles of material of a desired size pass during the screening operation, the size thereof being determined by the dimensions of the openings 52.

The screen panel 45 is so constructed that the end portions 54 of the stringers 48 extend laterally outwardly on each side of the panel for some distance beyond the last screening rod 50, that is, the screening rod disposed closest to the side of the panel. These end portions 54 define the side edge portions of the screen panel and are disposed in the screen box 10 in overlying relationship with a corresponding one of the upwardly directed bearing surfaces 42, as best seen in Fig. 5.

Each side edge portion of the screen panel 45, comprising the outwardly extending end portions 54 of the stringers 48, also includes resilient cushioning means surrounding each one of the end portions 54. In the present instance this means comprises a strip 56 formed of resilient material such as natural or synthetic rubber. The strip 56 may be square in cross-section and extends along the side edge portion of the screen panel 45 for the entire length of the panel. The strip 56 is attached to the side edge portion of the screen panel by forming a plurality of openings therethrough which extend transversely of the panel and which are spaced to correspond the end portions 54 of the stringer 48. The strip is then fitted over the end portions 54 by passing the latter through the openings therein. Preferably, the strip 56 is positioned slightly inwardly from the extreme ends 58 of the stringers 48, as shown in Fig. 5.

Each side edge portion of the screen panel 45 is also provided with positioning means fixed relative to the side edge portion and providing a generally vertical guide surface projecting above the cushioning means. As best seen in Figs. 4 and 5, this means may take the form of upstanding guide strips 60 rigidly secured to the end portions 54 of the stringers 48 and extending upwardly therefrom to provide laterally inwardly directed guide surfaces 62 which protrude above the strips 56 and which serve a purpose hereinafter described. Preferably, each of the upstanding guide strips 60 extends the entire length of the screen panel 45 and is secured to the end portions 54 of the stringers 48 in a position next adjacent to and laterally outwardly from the corresponding resilient strip 56 by passing the end portions 54 through openings formed in the guide strip and by welding the end portions to the guide strip about the outer edges of the openings. The upper edge portion 64 of the guide strip 60 is preferably bent slightly inwardly toward the panel 45, as shown in Fig. 5.

The screen panel 45 is maintained in place in the screen box 10 by an upper member, vertically spaced from the screen panel, having downwardly extending portions which engage the top of the cushioning means and apply a clamping force thereto and which at the same time engage the vertical guide surfaces 62 to position the panel in proper lateral relationship with the screen box 10. As disclosed, the upper member may take the form of a cover member 66, Fig. 3, which extends both transversely and longitudinally over the full dimensions of the screen panel 45 and thereby serves, in addition to the panel clamping and positioning function hereinafter described, the function of enclosing the top surface of the screen panel 45 from the immediate surroundings to prevent the influx of external contaminants to the product screened or the escape of dust particles raised by the screening operation.

The cover member 66 includes a central portion 68 which spans the major portion of the screen panel 45, this cental portion preferably having a stiffening rib 70 which extends the entire length of the panel and is formed in its middle portion by a series of bends, as best seen in Figs. 1 and 3. Also, a handle 71 may be secured to the top surface of the central portion in any convenient position to facilitate lifting or moving the cover member 66.

Along each side of the central portion 68, the cover member 66 is bent downwardly to form depending walls 72 which slope downwardly and outwardly therefrom and extend the full length of the screen box 10. The outer edge portion of each of the side walls 72 is bent slightly upwardly to form a marginal flange 74 extending therealong in a substantially horizontal plane. The dimensions of the various portions of the cover member 66 when unclamped are such that the opposed marginal flanges 74 are spaced apart a distance slightly less than the width of the screen panel 45 and the spacing between the upwardly directed bearing surfaces 42 of the screen box 10. As seen in Fig. 3, the lower surfaces 76 of the flanges 74 are downwardly directed bearing surfaces which engage the upper surfaces of the resilient strips 56 and cooperate with the upwardly directed bearing surfaces 40 to apply a clamping force to the strips. Also, the laterally outwardly facing end surfaces 78 of the flanges 74 engage the corresponding guide surfaces 62 of the guide strips 60 to position the screen panel 45 laterally with respect to the cover 66, as best seen in Figs. 3 and 5.

From the foregoing and by reference to Fig. 3, it will be evident that the application of a downwardly directed force to the upper surface of the cover member 66 will cause the marginal flanges 74 to be pressed down upon the resilient strips 56, clamping the strips between the upwardly directed bearing surfaces 42 and the downwardly directed bearing surfaces 76. The screen panel 45 will therefore be held in a vertically supported position by the forces applied to the end portions 54 of the stringers 48 through the resilient cushioning strips 56. Furthermore, the clamping force applied to the top of the cover member 66 will, due to the outward inclination of the side portions 72, tend to force the end surfaces 78 of the flanges 74 into firm engagement with the guide surfaces 62 and thereby properly position the screen panel 45 with respect to the cover and the screen assembly.

Although the clamping force may be applied to the upper surface of the screen member 66 in any suitable and conventional manner, in the present instance it is applied through a pair of channel members 80 connected to the top surface of the cover member by welding or the like. The channel members 80 are spaced longitudinally of the cover member 66 between the ends thereof and extend transversely beyond the plane of the flanges 74. Associated with each end of each channel member is a swing bolt 82 pivotally connected to a side wall member 38 of the screen box 10 by a pair of outwardly protruding ears 84 and a pivot pin 86. Each bolt 82 swings in a vertical plane normal to the side wall members 38 and is so positioned that the outer end portion thereof passes through a slot 88 formed in the end portion of the corresponding channel member 80. With the bolts 82 in their respective slots 88, a helical compression spring 90, a washer 92, and nut 94 are in that order placed over the end portion of each bolt 82 outwardly of the channel members 80. Tightening the nuts 94 by advancing them towards the screen box 10, it is evident, will apply a resilient clamping force, by virtue of the springs 90, to the channel members 80, which force is in turn transmitted to the upper portion of the cover member 66 by the channel members 80.

In comparison to other methods which might be employed for applying a clamping force to the cover member 66, it will be noted that the means disclosed are of particular advantage in that provision is made for the convenient installation or removal of the screen panel to or from the screen assembly 45. That is, by simply loosening or removing the nuts 94, the swing bolts 82 may be swung from the slots 88 leaving the cover mem-

ber 66 and screen panel 45 free and capable of being lifted from the screen box. Similarly, the cover 66 and screen panel are quickly connected to the screen box, after being properly positioned with respect to the bearing surfaces 42, by moving the swing bolts into the slots and tightening the nuts 94.

In the presently illustrated construction, the screen assembly is vibrated upon the resilient support provided by the springs 36 by a conventional vibrating unit of the unbalanced weight type. The vibrating unit is designated generally by the numeral 96 and includes a pair of unbalanced fly wheels 98 mounted for rotation with a shaft 100. The shaft 100 is rotatably supported within bearing assemblies 102, one bearing assembly being located at either side of the screen box 10. The shaft 100 extends through the interior of the screen box within a fixed tubular shield 104 which is sealed to the opposed side walls 38 of the screen box 10 to protect the rotating shaft 100 from the material being screened in the box. The shaft 100 is driven in rotation by means of a pulley 106 which in turn is driven by means of a belt or belts 108 from a drive shaft 110 and a drive pulley 112 driven by any suitable means.

Rotation of the shaft 110 drives the shaft 100 together with the associated fly wheels 98. Each of the fly wheels 98 is provided with an unbalanced counterweight so that rotation of the shaft 100 imparts a vibratory motion to the screen box 10.

Operation of the screen assembly illustrated is similar to more conventional screens insofar as the separatory process is concerned. Material to be separated may be fed into the feed spout 22 and thence onto the upper surface of the screen panel 45. Vibratory movement of the screen box 10 under the influence of the rotating counterweights conveys the material towards the discharge end of the screen panel, the finer elements of the incoming material passing through the openings 52 in the screen panel while the coarser elements remain on top of the screen panel and are eventually discharged over the lip 28. Material passing through the screen panel falls onto the bottom plate 12 and is discharged through the spout 26.

It is to be understood that the form of this invention herewith shown and described is to be taken as the preferred example of the same, and that various changes in the shape, size, and arrangement of the parts may be resorted to without departing from the spirit of the invention or the scope of the subjoined claims.

Having thus described the invention, I claim:

1. In a vibrating screen assembly, the improvement comprising a screen box having laterally spaced side walls each provided with an upwardly facing bearing surface extending longitudinally of said screen box, a substantially rigid screen panel spanning said side walls and having two opposed side edge portions each overlying a corresponding one of said bearing surfaces, resilient cushioning means overlying the top and bottom surfaces of each of said side edge portions, positioning means fixed relative to each of said side edge portions and providing generally vertical guide surfaces projecting above said cushioning means, an upper member positioned in overlying spaced relationship with said screen panel, said upper member having downwardly extending portions which simultaneously engage the top of said cushioning means and said vertical guide surfaces, and means for urging said upper member downwardly toward said bearing surfaces to apply a clamping force to said cushioning means through said downwardly extending portions.

2. In a vibrating screen assembly, the improvement comprising a screen box having laterally spaced side walls each provided with an upwardly facing bearing surface extending longitudinally of said screen box, a substantially rigid screen panel spanning said side walls and including a plurality of transversely disposed stringers spaced longitudinally of said screen box with the opposite end portions thereof overlying said bearing surfaces, resilient cushioning means surrounding the opposite end portions of said stringers and engaging the corresponding bearing surfaces, positioning means fixed relative to each side edge of said screen panel and providing a generally vertical guide surface projecting above said cushioning means, an upper member positioned in overlying spaced relationship with said screen panel, said upper member having downwardly extending portions which simultaneously engage the top of said cushioning means and said vertical guide surfaces, and means for urging said upper member downwardly toward said bearing surfaces to apply a clamping force to said cushioning means through said downwardly extending portions.

3. In a vibrating screen assembly, the improvement comprising a screen box having laterally spaced side walls each provided with an upwardly facing bearing surface extending longitudinally of said screen box, a substantially rigid screen panel spanning said side walls and including a plurality of transversely disposed stringers spaced longitudinally of said screen box with the opposite end portions thereof overlying said bearing surfaces, a strip of resilient cushioning material disposed along each side edge of said screen panel and having a plurality of openings through which the corresponding end portions of said stringers are passed, a rigid guide strip disposed along each side edge of said screen panel and secured to the corresponding end portions of said stringers laterally outwardly of the corresponding cushioning strip, said guide strip having a generally vertical guide surface facing laterally inwardly and projecting above said cushioning strip, an upper member positioned in overlying spaced relationship with said screen panel, said upper member having two downwardly directed side portions each formed to provide a downwardly facing bearing surface extending longitudinally of said screen box and engaging the top of a corresponding one of said cushioning strips and a laterally outwardly facing surface extending longitudinally of said screen box and engaging the corresponding one of said guide surfaces, and means for urging said upper member downwardly toward said bearing surfaces to apply a clamping force to said cushioning means through said downwardly directed side portions.

4. In a vibrating screen assembly, the improvement comprising a screen box having laterally spaced side walls each provided with an upwardly facing bearing surface extending longitudinally of said screen box, a substantially rigid screen panel positioned in said screen box with each of the opposite side portions thereof overlying a corresponding one of said bearing surfaces, means forming an upwardly extending guide surface along each side edge portion of said screen panel, a cover member overlying said screen panel in vertically spaced relationship therewith and having downwardly extending side portions formed along each side edge thereof, each of said side portions being formed to provide a downwardly facing bearing surface overlying a respective one of said upwardly facing bearing surfaces and a laterally facing surface for engaging the corresponding guide surface, resilient cushioning means between said upwardly facing bearing surfaces and said side edge portions of said screen panel and between said side edge portions and said downwardly facing bearing surfaces, and means for urging said cover member downwardly toward said upwardly facing bearing surfaces to apply a clamping force to said cushioning means through said downwardly extending side portions.

5. In a vibrating screen assembly, the improvement comprising a screen box having laterally spaced side walls each provided with an upwardly facing bearing surface extending longitudinally of said screen box, a substantially rigid screen panel positioned in said screen box with each of the opposite side portions thereof over-

lying a corresponding one of said bearing surfaces, a cover member overlying said screen panel in vertically spaced relationship therewith and having downwardly extending side portions formed along opposite side edges thereof, each of said side portions being formed to provide a downwardly facing bearing surface overlying a respective one of said upwardly facing bearing surfaces, resilient cushioning means between said upwardly facing bearing surfaces and said side edge portions of said screen panel and between said side edge portions of said screen panel and said downwardly facing bearing surfaces,

means for urging said cover member downwardly toward said upwardly facing bearing surfaces to apply a clamping force to said cushioning means through said downwardly extending side portions, upwardly protruding positioning means formed along each side edge portion of said screen panel, and means on each of said downwardly extending side portions of said cover member for engaging the corresponding one of said positioning means to laterally position said screen panel with respect to said cover member.

No references cited.