

Jan. 1, 1963

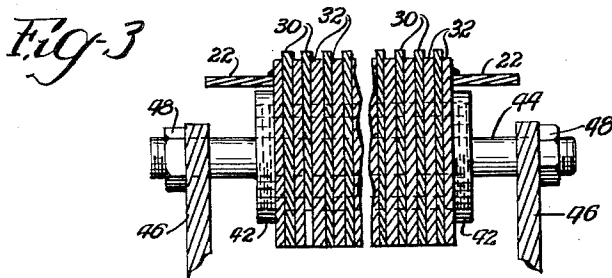
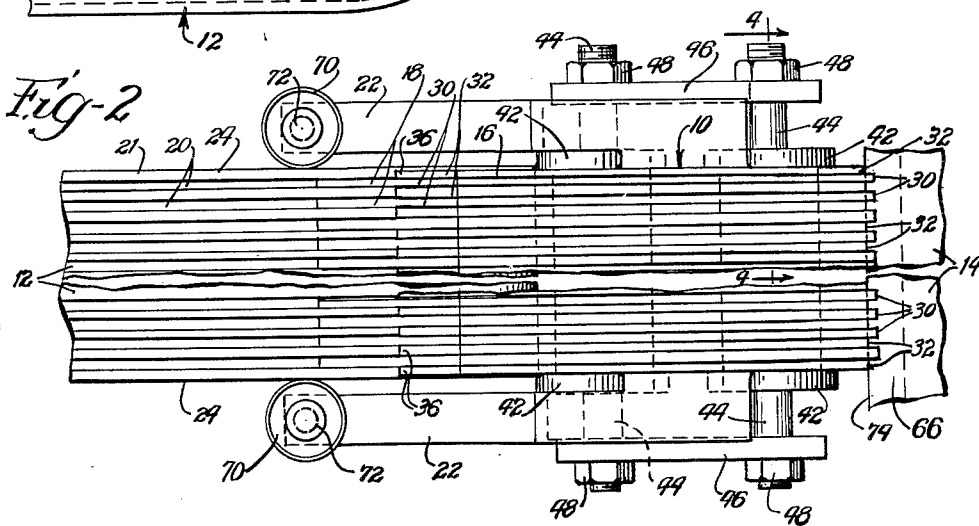
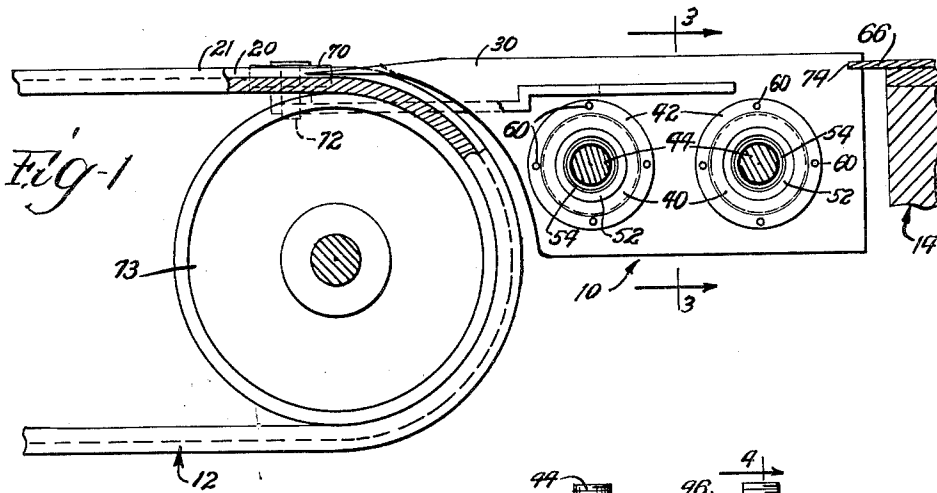
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3,071,234

FLOATING COMB PLATE

Filed Jan. 9, 1959

3 Sheets-Sheet 1



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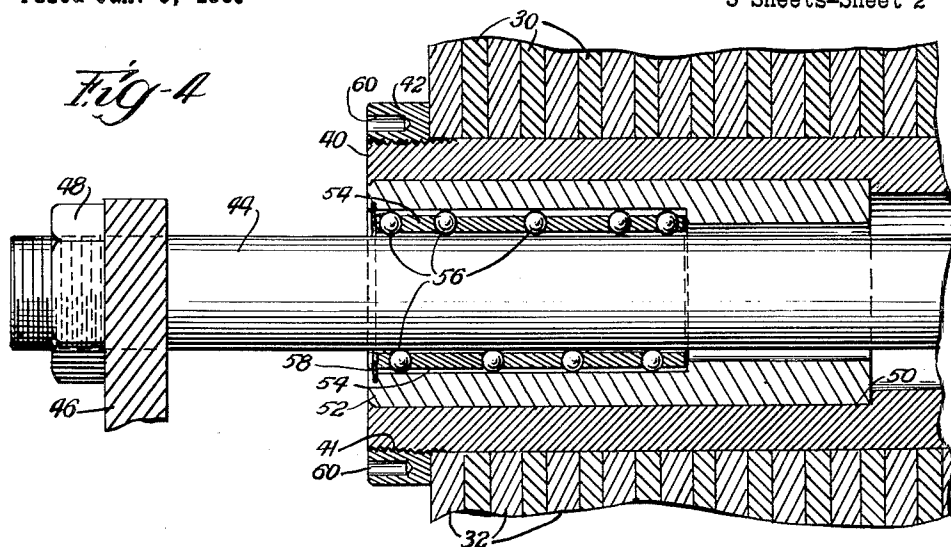


Fig-5

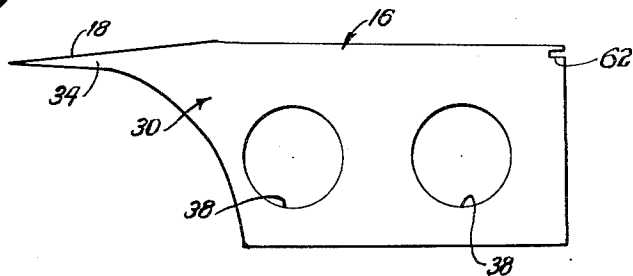
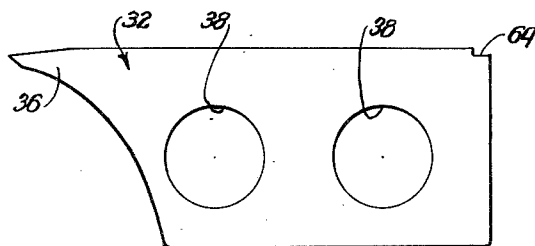


Fig-6



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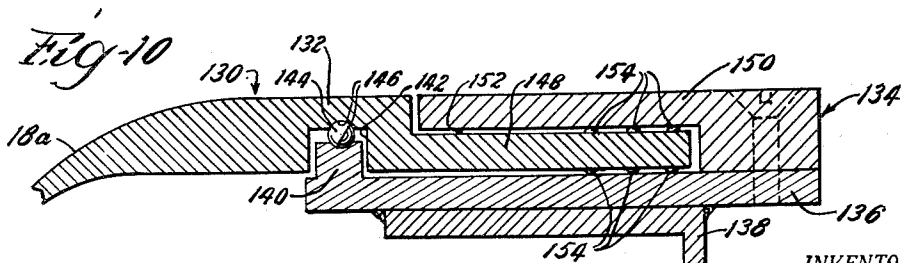
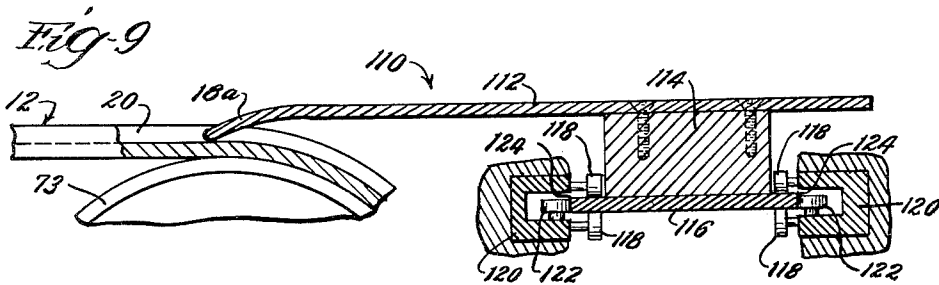
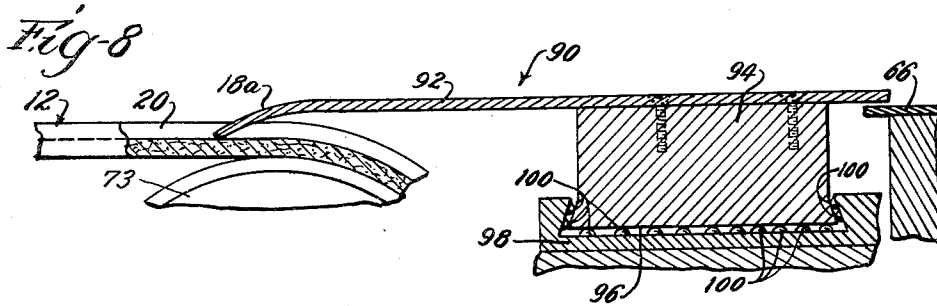
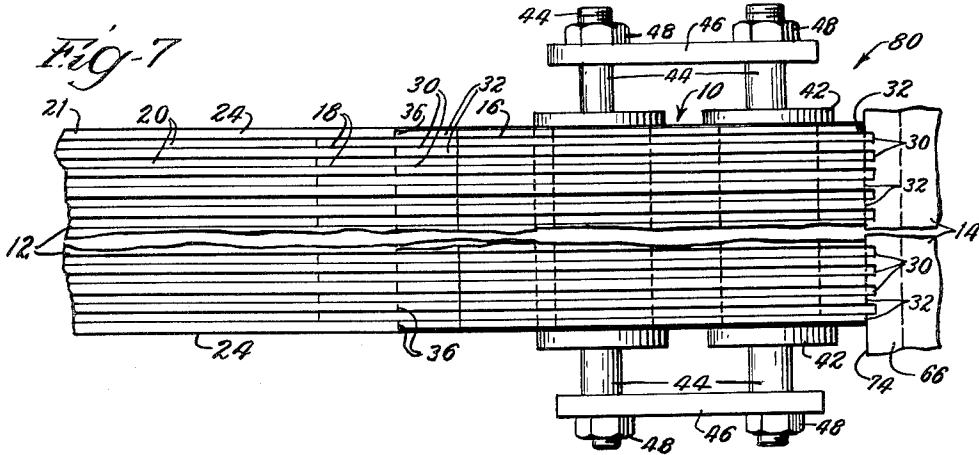
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FLOATING COMB PLATE

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3 Sheets-Sheet 3



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3,071,234

FLOATING COMB PLATE

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16 Claims. (Cl. 198-16)

Our invention relates to a floating or self-aligning comb plate for moving sidewalks, escalators and the like, and more particularly, to a comb plate and grooved conveyor construction which insures that the comb plate will always be properly aligned with the grooves of the conveyor.

Comb plates for escalators and the like are conventionally fixedly mounted at the ends of the conveyor. However, the conveyor frequently develops a sidewise shifting movement during its operation which tends to draw the grooves of the conveyor out of alignment with the comb plate projections with consequent damage to the conveyor.

A principal object of our invention is to provide a comb plate that floats sidewise with the conveyor so that the comb plate projections are always properly aligned with the conveyor grooves.

Another object of the invention is to provide improved passenger transportation apparatus of the moving sidewalk type employing a floating comb plate structure co-operating with an endless conveyor belt having a grooved load supporting surface.

A further object of the invention is to provide a mounting arrangement for comb plates that permits same to shift sidewise with the conveyor.

Another object of the invention is to provide a floating or self-aligning comb plate that is economical of manufacture, efficient in use, and readily adapted for use in a wide variety of conveyor installations.

Other objects, uses, and advantages will be obvious or become apparent from a consideration of the following detailed description and the application drawings.

In the drawings:

FIGURE 1 is a side elevational view, partially in section, of one embodiment of our invention applied to an end of an endless belt conveyor having, in accordance with our invention, a grooved load supporting surface;

FIGURE 2 is a plan view of the device shown in FIGURE 1, parts being broken away;

FIGURE 3 is a diagrammatic cross-sectional view along line 3-3 of FIGURE 1;

FIGURE 4 is a fragmental cross-sectional view along line 4-4 of FIGURE 2;

FIGURES 5 and 6 are side elevational views of the segments forming a part of the embodiment of our invention shown in FIGURES 1-4; and

FIGURES 7-10 illustrates modified forms of the invention, FIGURE 7 being a view similar to that of FIGURE 2 and FIGURES 8-10 being vertical sectional views taken transversely of the conveyor.

Reference numeral 10 in FIGURES 1 and 2 generally indicates a comb plate arranged in accordance with the principles of our invention and applied between an endless belt conveyor 12 and a stationary passenger platform 14. For purposes of our invention, the belt 12 may run in either direction so that platform 14 could either be a passenger take-off platform or a passenger landing platform.

Generally speaking, the comb plate 10 of FIGURES 1-6 generally comprises a comb plate member 16 formed with projections 18 that extend into grooves 20 of the conveyor belt load supporting surface 21. In accordance with the principles of our invention, the comb plate member 16 is mounted for side-wise movement with respect

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to the conveyor 12 and in the embodiment of FIGURES 1-6 is provided with guide arms 22 that engage the edges 24 of the belt whereby sidewise movement of the belt is transmitted to the comb plate member. The comb plate is thus a floating or self-aligning comb plate.

The conveyor 12 is only diagrammatically illustrated, but that illustrated is intended to represent a conventional form of endless conveyor which, in accordance with our invention, is provided with a grooved load supporting surface. The grooves 20 should be ordinarily equidistantly spaced across the width of the belt (grooves 20 should be spaced apart a distance on the order of 1/4 inch), and the respective grooves 20 ordinarily should have a substantially quadrilateral (slightly trapezoidal in the preferred embodiment) cross-sectional configuration. Though a belt conveyor is illustrated, it is to be understood that the floating comb plate of our invention is equally applicable to escalators which conventionally may be formed with grooved load supporting surfaces.

The comb plate member 16 in its illustrated form is made up of a plurality of alternating relatively large segments 30 and relatively small segments 32. The segments 30 and 32 may be formed from metal or rubber, or any other suitable material, as may be necessary or desirable under the circumstances.

The segments 30 (see FIGURE 5) are each formed with a pointed extension 34 that makes up the projection 18 of the segment, while the segments 32 are formed with relatively blunt extensions 36 that terminate short of extensions 34.

Both the segments 30 and 32 are formed with a pair of circular holes or perforations 38 that receive tubular mounting shafts 40 (see FIGURE 4) formed with screw threaded ends 41. A sufficient quantity of the segments 30 and 32 are positioned on the shafts 40 in alternating relationship and then nuts 42 are turned on ends 41 and against the outer segments to fasten them together on the shafts 40.

The shafts 40 each receive a stationary support shaft 44 which is fixed at its ends to appropriate stationary supports 46 that may take any desired shape and which are only diagrammatically illustrated. The shafts 44 may be held to the supports 45 as by nuts 48, or in any other suitable manner.

Each end of each tubular shaft 40 is counterbored as at 50 to receive a hardened bushing 52. Interposed between each bushing 52 and the respective shafts 44 is an appropriate form of ball bearing retainer 54 in which a plurality of ball bearings 56 are mounted in any appropriate manner. The ball bearing retainer may be held in position by an appropriate form of retainer, such as that diagrammatically illustrated at 58. The ball bearings comprise anti-friction means interposed between shafts 40 and 44.

The nuts 42 may be formed with recesses 60 that are adapted to receive an appropriate tool to aid in their application or removal.

The segments 30 may be grooved as at 62 and the segments 32 are recessed as at 64 to receive the end of bridge plate 66 that may be fixed to the platform 14 in any suitable manner and spans the gap between the end of the comb plate 10 and the platform 14. Segment grooves 62 and recesses 64 as well as bridge plate 66 may be eliminated without adversely affecting the operability of our invention.

Guide arms 22 are secured to the sides of the outer segments in any suitable manner (as by welding in the embodiment of FIGURES 1-6) and extend from the comb plate to points adjacent the edges 24 of the conveyor 12. Rollers 70, rotatably mounted on the respective arms 22 as by pins 72 and positioned over end pulley

73 of conveyor 12, actually engage the respective edges 24.

When the comb plate is assembled and applied to its support in the manner indicated in the drawings, the pointed extensions 34 of segments 30 will project into the grooves 20 (which preferably are on the order of $\frac{3}{16}$ inch in width) of the belt conveyor 12, and, where bridge plate 66 is employed, the edge 74 of the bridge plate 66 will be received in notches 62 and recesses 64 of the segments. The conveyor 12 is operated in the usual manner and upon sidewise movement thereof, the comb plate member 16 is moved sidewise a corresponding amount by the sidewise pressure that is applied to a guide arm 22. The comb plate member 16 thus floats sidewise with the conveyor 12 and the projections 18 are maintained in alignment with the grooves 20 of the conveyor. Of course, during this movement the comb plate is moving with respect to the bridge plate 66.

As mentioned hereinbefore, the comb plate structure 10 may be applied to either end of the conveyor. The belt conveyor 12 is only one type of conveyor to which the invention may be applied; it is contemplated that the device 10 may be applied with equal facility to escalators and the like. Furthermore, our invention is not limited to passenger transportation apparatus, but may be applied to material handling apparatus as well.

In the embodiment 80 of FIGURE 7, the guide arms 22 have been omitted, the comb plate otherwise being arranged in the same manner as the embodiment of FIGURES 1-6 (like reference numerals indicating like parts). It has been found that the engagement of the belt with projections 18 effects the floating action described above without requiring any further interengagement between the comb plate and the belt 12.

The embodiment 90 of FIGURE 8 includes a comb plate 92 formed with projections 18a that extend into grooves 20 of belt 12. Plate 92 is fixed in any suitable manner to base 94 that extends transversely of the conveyor 12 and that rides in dovetail groove 96 formed in stationary supporting member 98 (that is mounted adjacent the conveyor in any suitable manner near platform 14). Groove 96 may be provided with a multiplicity of bead welds 100 on which base 94 rides, groove 96 being suitably lubricated with grease or the like to establish a substantially friction-free floating action. Comb plate 92 may overlap bridge plate 66 in this embodiment.

The groove 96 may be open at the ends of member 98 to permit base 94 to be inserted into groove 96 from one of its ends.

The embodiment 110 of FIGURE 9 includes a comb plate 112 that is similar to comb plate 92, it including projections 18a that project into grooves 20 of belt 12 and being suitably fixed to base 114 that extends transversely of belt 12. Base 114 coextensively carries transversely extending plate structure 116 that is engaged by supporting rollers 118 journaled in any suitable manner to spaced transversely extending supports 120 that are coextensive with structure 116. The spaced supports 120, which are secured in place in any suitable manner, may be provided with guide rollers 122 that engage the sides 124 of the plate structure 116 for purposes of guiding the floating action of the device 110.

In the embodiment 130 of FIGURE 10, the comb plate structure is in the form of several segments 132 mounted side by side for floating movement in tandem transversely of the conveyor within fixed supporting plate structure 134 that extends transversely of the conveyor. Plate structure 134 may comprise a base plate 136, fixed to stationary cross member 138 in any suitable manner, and including a ridge 140 that is received in groove 142 of the respective comb plate segments. Ball bearings 144 secured in a suitable retainer (not shown) and riding in grooves 146 may be interposed between the ridge 140 and the comb plate segments 132, segments 132 including projections 148 that underlie cover plate 150. When 75

a comb plate segment 132 requires replacement, it may be removed by sliding same laterally of the belt and out of the pocket 152 formed by plates 136 and 150, or by removing plate 150, new segments 132 being applied in a similar manner. Comb plate projections 148 prevent any substantial vertical tilting of the comb plate segments and may be provided with bead welds 154 or suitable bearings to obtain the frictionless floating action desired.

Segments 132 each include projections 18a that engage grooves 20 of belts similar to belt 12. The number of segments 132 employed in any installation will depend on the width of the conveyor belt. Segments 132 float in tandem laterally of the belt on sidewise movement of the belt.

The embodiments of FIGURES 8-10 all operate in substantially the same manner as the embodiments of FIGURES 1-7 and do not require guide arms equivalent to guide arms 22.

Of course, the embodiments of FIGURES 7-10 may be applied to either end of the conveyor and may be applied to escalators and the like as well as belt conveyors.

One of the important advantages of our invention is that it permits the conveyor to be operated in either direction, where reversibility is desirable, and still have the comb projections properly aligned with the belt grooves without attempting to restrain the sidewise movement of the belt. It is virtually impossible to train and keep a belt so restrained that there will be no sidewise movement, and in any belt there is a certain amount of side warpage which causes an entirely different ride on reversal of operating direction. Attempts to restrain sidewise movement of the belt involve excessive wear on the expensive structure making up the belt, which is eliminated when our invention is employed.

When the comb plate structures are to be removed by displacing them laterally of the conveyor, their supports may be mounted for vertical movement so that projections 18 or 18a may be elevated above the ridges formed by grooves 20, or end pulley 73 may be mounted in any suitable manner to lower the belt with respect to these projections. And, of course, comb plates of the type shown at 92 and 112 of FIGURES 8 and 9 may be removably held in place as by suitable screws, as shown.

This application is a continuation-in-part of our application Serial No. 648,021, filed March 25, 1957 and now abandoned.

The foregoing description and the drawings are given merely to explain and illustrate our invention, and the manner in which it may be performed, and the invention is not to be limited thereto, except insofar as the appended claims are so limited, since those skilled in the art who have our disclosure before them will be able to make modifications and variations therein without departing from the scope of the invention.

We claim:

1. A comb plate for a conveyor belt having a grooved load supporting surface comprising a comb member including projections received in the grooves of the belt and mounted for movement sidewise of the belt, and spaced guide elements secured to the comb member, said guide elements engaging opposite sides of the belt.

2. In a comb plate adapted to be positioned adjacent an end of a conveyor belt having a grooved load supporting surface, the improvement wherein the comb plate is mounted for movement sidewise of the belt, and wherein the comb plate is provided with guide elements engaging the sides of the belt, whereby sidewise movement of the belt is transmitted to the comb plate.

3. A comb plate for endless conveyors having a grooved load supporting surface, comprising a comb member including a plurality of projections formed to be received in the grooves of the endless conveyor, said member being mounted for substantially frictionless movement sidewise of the conveyor, and guide elements,

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extending between the comb member and the edges of the conveyor whereby sidewise movement of the conveyor is transmitted to the comb member.

4. In a comb plate adapted to be positioned adjacent an end of the conveyor belt having a grooved load supporting surface, the improvement wherein the comb plate is movably mounted on spaced generally horizontal supports extending transversely of the conveyor belt, and wherein the comb plate is provided with guide elements engaging the sides of the belt, whereby sidewise movement of the belt is transmitted to the comb plate.

5. The improvement set forth in claim 4 wherein anti-friction means is interposed between the comb plate and said supports.

6. In a comb plate adapted to be positioned adjacent end of an endless conveyor having a grooved load supporting surface, the improvement wherein the comb plate is composed of a plurality of vertically disposed segments, wherein alternate segments project into the grooves of the conveyor, said segments being secured together on spaced, transversely extending tubular members, wherein said tubular members are mounted on supports that extend crosswise of the conveyor, said tubular members being mounted for sidewise movement with respect to the conveyor, and wherein the comb plate is provided with guide elements that engage the sides of the conveyor, whereby sidewise movement of the conveyor is transmitted to the comb plate.

7. The improvement set forth in claim 6 wherein anti-friction means is interposed between the respective tubular members and said supports.

8. A comb plate support comprising spaced tubular members extending crosswise of the comb plate, fixedly mounted supports received in each tubular member, and anti-friction means interposed between the respective tubular members and fixed supports.

9. A comb plate for cooperation with the grooved surface of an endless conveyor comprising a relatively rigid member composed of a plurality of vertically disposed segments extending longitudinally of the conveyor, a plurality of transversely extending tubular members extending through said segments and disposed crosswise of the conveyor, means for clamping said segments together on said tubular members, stationary support means extending through said tubular members, anti-friction means interposed between said tubular members and the respective stationary support means, and guide arms extending between each side of the comb plate and the corresponding sides of the conveyor, said guide arms carrying rollers that are in contact with said corresponding sides of the conveyor.

10. Conveyor apparatus comprising an endless conveyor having a grooved load supporting surface, a stationary platform extending cross-wise of the conveyor, and a floating comb member interposed between the platform and the conveyor, said comb member being mounted for substantially frictionless movement sidewise of the conveyor, and including a plurality of projections received in the respective grooves of the endless conveyor,

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and guide means extending between said comb member and said endless conveyor, whereby, sidewise movement of the endless conveyor on operation thereof is transmitted to said comb member.

11. The conveyor apparatus set forth in claim 10 wherein a bridge member is interposed between said platform and said comb member, said bridge member being fixed to said platform and said comb member slidingly engaging said bridge member.

12. In conveyor apparatus comprising an endless conveyor member having a grooved load supporting surface, a stationary platform extending cross-wise of the conveyor member, and a comb member interposed between the platform and the conveyor member and including a plurality of projections received in grooves of said load supporting surface, the improvement wherein said comb member is mounted for movement sidewise of the conveyor member, whereby said comb member may float laterally with the conveyor member on sidewise movement of the latter.

13. In conveyor apparatus comprising an endless conveyor member having a grooved load supporting surface, the improvement wherein a comb member is positioned adjacent the load supporting surface of the conveyor member, said comb member including projections that are received in at least some of the grooves of the endless conveyor member, and including means for mounting said comb member for movement sidewise of the conveyor member, whereby said comb member moves sidewise of the conveyor member on sidewise movement of the latter.

14. The improvement set forth in claim 13 wherein said comb member comprises a plurality of segments moving in tandem on sidewise movement of the conveyor member.

15. Conveyor apparatus comprising an endless conveyor belt provided with a grooved load supporting surface, and a comb member positioned adjacent the load supporting surface of said conveyor belt and including projections that are received in at least some of the grooves of said endless belt, said comb member being mounted for substantially frictionless movement sidewise of the belt whereby said comb member may float laterally with the belt on sidewise movement of the latter.

16. A conveyor comprising, an endless belt having a plurality of longitudinally extending ribs forming the load carrying surface, a comb at an end of travel of the conveyor, said comb having teeth intermeshing with said ribs, and means supporting said comb for lateral movement to enable said comb teeth to shift with lateral shifting of said belt.

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