Jan. 12, 1954 L. D. HAGENBOOK 2,665,798

TROUGH

Filed Dec. 5, 1950

3 Sheets-Sheet 1

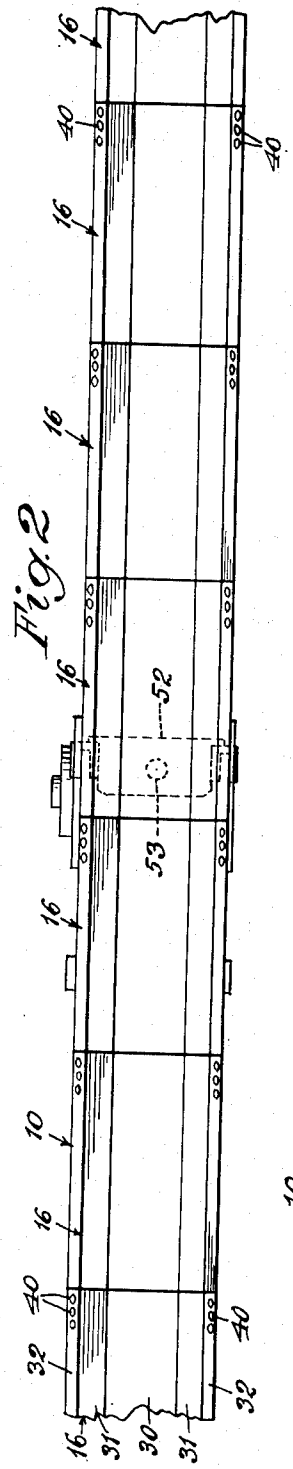


Fig. 2

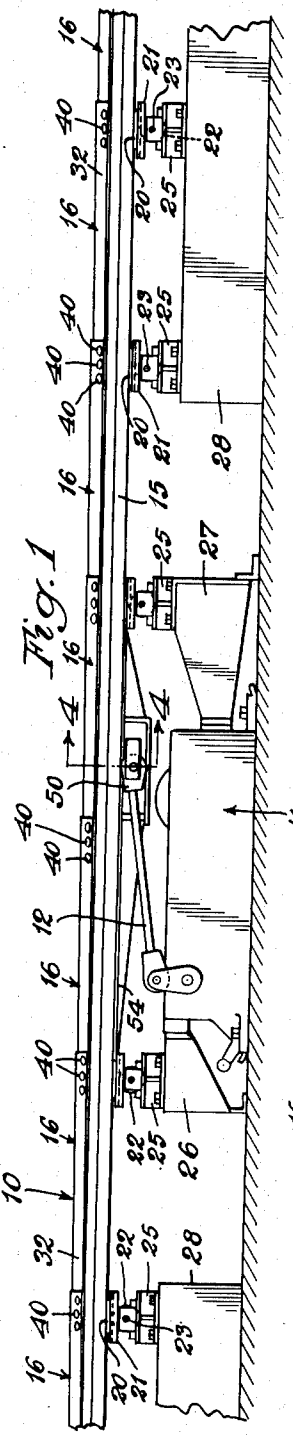


Fig. 1

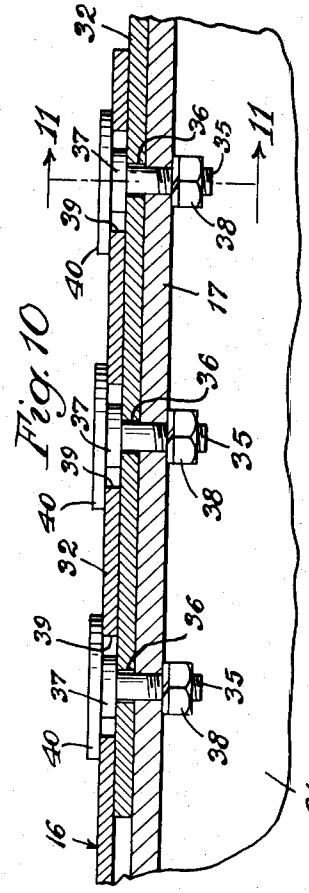


Fig. 10

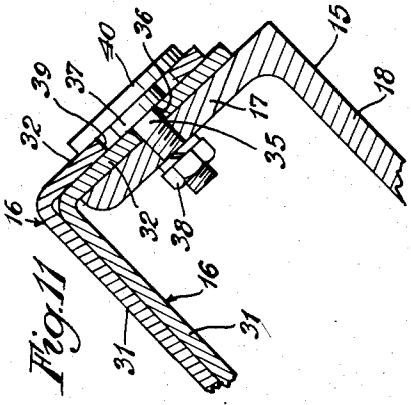


Fig. 11

Inventor
Loy D. Hagenbook
by Murray A. Gleeson
Attorney

Jan. 12, 1954 L. D. HAGENBOOK 2,665,798

TROUGH

Filed Dec. 5, 1950 3 Sheets-Sheet 2

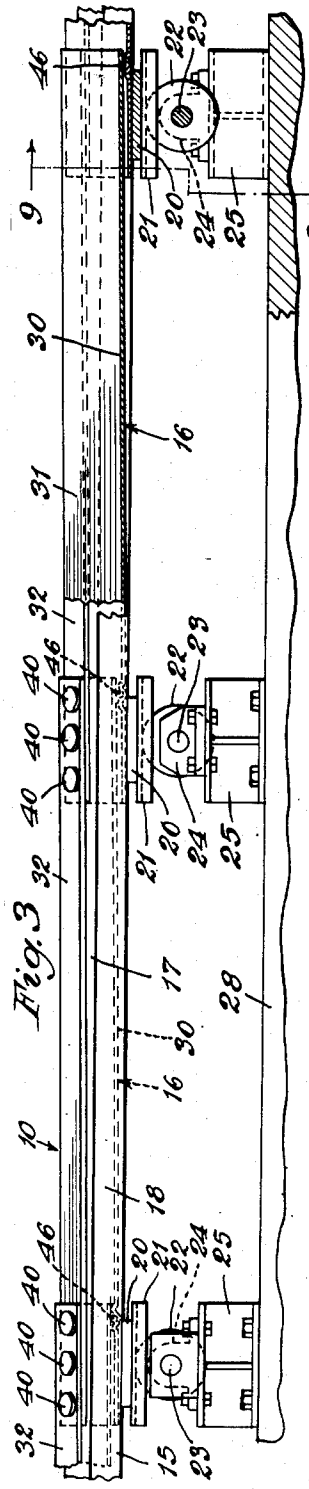


Fig. 3

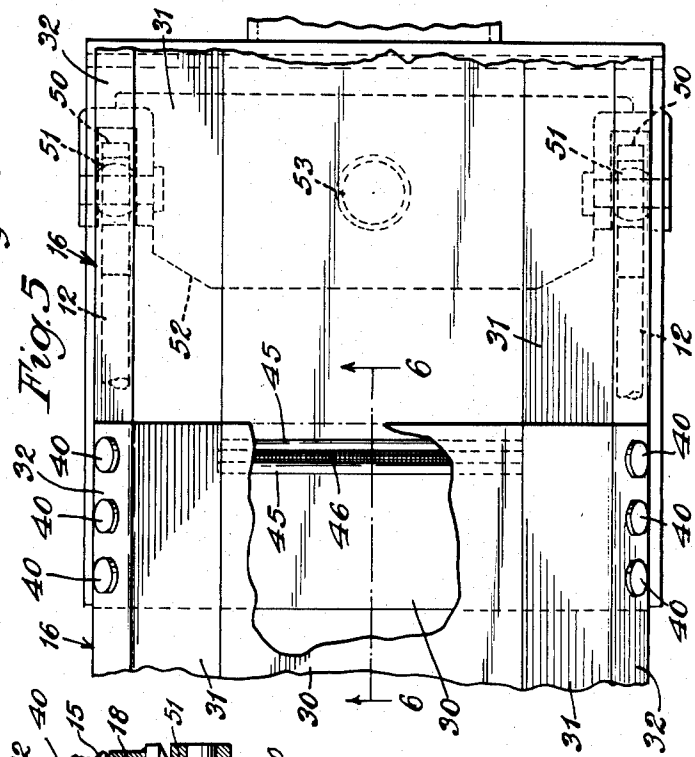


Fig. 5

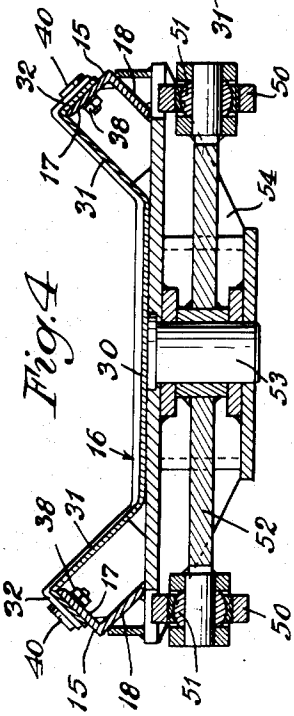


Fig. 4

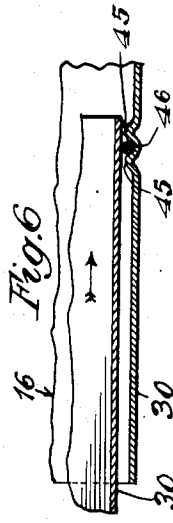


Fig. 6

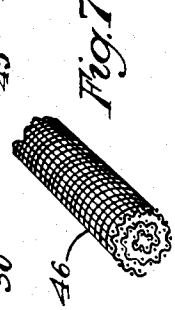


Fig. 7

Inventor
Loy D. Hagenbook
by Murray A. Gleeson
Attorney

Jan. 12, 1954 L. D. HAGENBOOK 2,665,798

TROUGH

Filed Dec. 5, 1950

3 Sheets-Sheet 3

Fig. 9

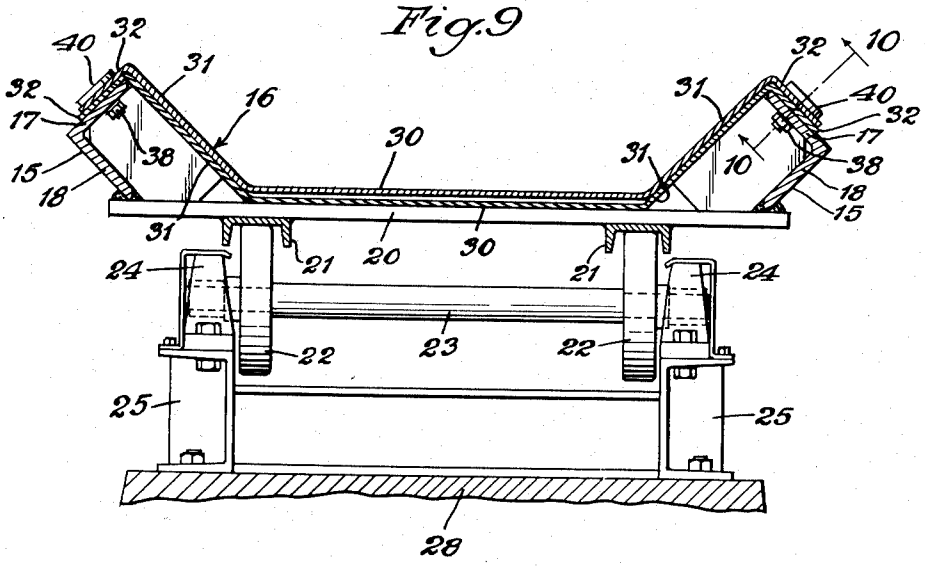
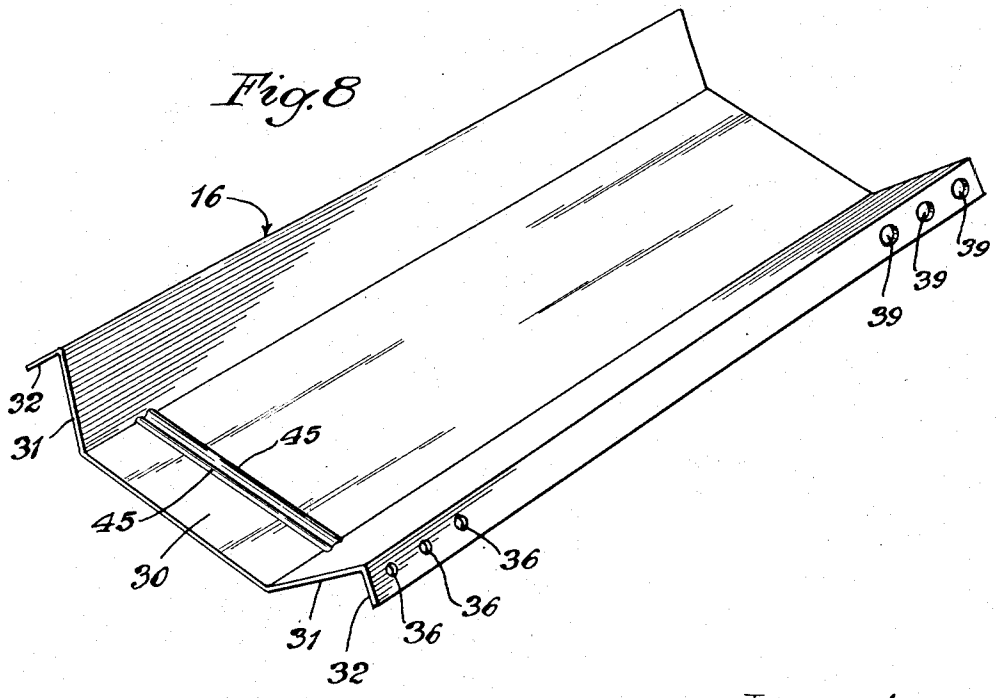


Fig. 8



Inventor
Loy D. Hagenbook
by Murray A. Gleeson
Attorney

Patented Jan. 12, 1954

2,665,798

UNITED STATES PATENT OFFICE

2,665,798

TROUGH

Loy D. Hagenbook, Chicago, Ill., assignor to Goodman Manufacturing Company, Chicago, Ill., a corporation of Illinois

Application December 5, 1950, Serial No. 199,327

5 Claims. (Cl. 198—220)

1

This invention relates to improvements in shaker conveyor troughs particularly adapted for transporting loose materials at relatively high temperatures.

The principal object of the invention is to provide an improved trough structure designed to accommodate itself to expansion and contraction caused by wide variations in temperatures of the material being carried in the trough from time to time.

A further object is to provide an improved trough structure for minimizing the effect of expansion and contraction upon the main load-carrying elements of the trough under varying temperature conditions.

Other objects and advantages of the invention will appear from time to time as the following description proceeds.

The invention may best be understood by reference to the accompanying drawings, in which:

Figure 1 is a side view of a shaker conveyor pan line employing one embodiment of the present invention;

Figure 2 is a plan view of Figure 1;

Figure 3 is a fragmentary enlarged view of Figure 1, partly in longitudinal section;

Figure 4 is a cross-sectional view of Figure 1 taken along line 4—4;

Figure 5 is a fragmentary plan view of Figure 3 showing one means for sealing the joints between adjoining sections;

Figure 6 is an enlarged cross-sectional view of Figure 5 taken along line 6—6;

Figure 7 is an enlarged fragmentary perspective view of one form of the sealing member;

Figure 8 is a perspective view of one trough section;

Figure 9 is a cross-sectional view of Figure 3 taken along line 9—9;

Figure 10 is a fragmentary longitudinal sectional view of Figure 9 taken along line 10—10;

Figure 11 is a section of Figure 10 taken along line 11—11.

Referring now to details of the embodiment of the invention illustrated in the drawings, Figure 1 is a view in side elevation of a portion of a conveyor trough line, indicated generally at 10, and with a shaker drive mechanism, indicated generally at 11, disposed beneath the trough in position to impart a shaking or vibratory feeding movement thereto. The general arrangement of the trough and its shaking mechanism may be the same as has heretofore been widely used in transporting loose materials with a so-called shaker motion, wherein the shaker mechanism 11

2

is connected to the trough line 10 as by pitmans 12, 12 so as to impart a reciprocal movement to the latter of variable acceleration in opposite directions, thereby causing the material on the trough to be moved in one direction therealong. Since such shaker mechanisms and the principle of conveying material by shaking motion are well known in the art, it is unnecessary to describe in further detail the shaker mechanism 11 shown for illustrative purposes herein.

The trough line 10 consists essentially of a pair of laterally spaced side frame members 15, 15 which extend the full length of the trough line and comprise a substantially rigid structural frame for the trough, and a plurality of individual pan sections 16, 16 which are mounted on and connected to the side frame members 15 in such a manner as to permit endwise expansion and contraction of said pan sections independently of each other and of the side frame members.

In the form shown herein, the side frame members 15, 15 consist of angle bars with upper legs 17 and lower legs 18 disposed substantially at right angles to each other but with the two legs facing inwardly toward each other at an angle of approximately 45 degrees to the horizontal plane of the trough. These side frame members may consist of continuous lengths of angle bars extending the full length of the conveyor or they may be made up of a plurality of sectional lengths spliced or otherwise secured together at abutting ends in any suitable manner to provide in effect continuous substantially rigid load-carrying elements extending the full length of the pan line along opposite sides thereof.

The side frame members are tied together transversely at suitably spaced intervals by tie bars 20, 20. As shown herein, these tie bars are fastened to the ends of the lower legs 18, 18 of said side frame members as by welding. Attached to the under faces of each of the tie bars 20 is a longitudinally disposed channel member 21 engaged by rollers 22, 22 for supporting the pan line for its reciprocal motion. In the form shown herein, the rollers 22 are mounted on shafts 23 journalled in bearings 24 carried on standards 25. All the standards, with their rollers, are mounted by suitable means at the proper level to support the full length of the pan line. As shown in Figure 1, some of the standards 25 may be mounted on extended frames 26 and 27 connected at opposite ends to the shaker mechanism 11, while other standards 25 may be mounted along horizontally disposed base members 28.

Referring now to details of the individual pan sections 16 and the method of connecting them in supporting relation to the side frame members 15, one of said pan sections 16 is shown in Figure 8. Each such pan section is made of sheet metal formed with a longitudinally disposed bottom 30 and outwardly and upwardly inclined side walls 31, 31 terminating in downwardly and outwardly inclined flanged portions 32, 32.

One end of each pan section is fastened to the side frame members 15 with a substantially rigid connection. In the form shown herein, the connecting means consists of a plurality of bolts 35, herein three in number, passing outwardly through the upper legs 17 of the side frame members 15 and fitting snugly through bolt holes 36, 36 formed along the flanges 32, 32 of said pan section 16 adjacent the end of the latter that is fastened directly to the side frame members 15. The bolts 35 have heads 37 engaging the outer faces of the proximate flanges 32 of the lower pan section 16. The heads 37 also have superimposed retaining plates 40, 40 integral therewith for purposes to be hereinafter described. Nuts 38, threaded on the inner ends of the bolts 35, hold the proximate flanges 32 of the lower pan section 16 firmly against the upper faces of the legs 17 of the side frame member 15, as shown in Figures 9 and 11.

The opposite or right-hand end of the pan section shown in Figure 8 is mounted in the pan line 10 so that it nests in longitudinally sliding relation within and above the proximate end of the next adjacent pan section 16. For instance, by reference to Figure 3, it will be seen that the pan section 16, shown toward the left side of this figure, has its right end nested in and above the left end of the next or right-hand pan section 16 shown toward the right end of this figure. Holes 39, 39 are provided in the flanges 32 of the left pan considerably larger than the holes 36, 36 in the right-hand pan, and, which register with the heads 37 of the bolts 35 which secure the right-hand pan section to the side frame members 15. The holes 39, 39 just mentioned are sufficiently larger than the heads 37 to permit considerable flexibility of longitudinal movement between the lapped portions of the right- and left-hand pan sections. Retaining plates 40, 40, formed integral with the heads 37 and extending laterally above as previously mentioned, are substantially larger in diameter than the enlarged holes 39 of the overlapping pan section, so as to retain the end of the latter pan section against vertical displacement with respect to the side frame members.

It will now be understood that, by reason of the fastening means above described, each of the pan sections 16 is individually anchored at one end to the side frame members but has its opposite end nested in and above the end of the next adjacent pan section, with the fastening means for the next pan section also arranged to hold the relatively free end of the first pan section against vertical displacement in the pan line but permitting limited longitudinal sliding or telescoping adjustment between the lapped portions of the two pans, as may be required during excessive expansion and contraction of the several pan sections.

The lapped joints between adjoining pan sections 16 are preferably supported on the tie bars 20, to strengthen the pan line as a whole at these points.

It will also be observed from Figures 5, 6, 7 and 8 that each of the pan sections 16 is provided near its normally anchored end with a pair of transverse ridges 45, 45 formed transversely of the bottom plate 30 thereof, between which ridges is disposed a resilient or deformable sealing strip 46, herein consisting of a coil of wire screen, as shown in Figure 7. Other heat-resistant, deformable sealing material such as asbestos rope may be used for the sealing strip. Said sealing strip extends slightly above the level of the transverse ridges 45, 45 in position to be engaged by the under face of the bottom plate 30 of the adjacent overlapping pan section, in all permissible positions of expansion and contraction of the two lapped ends of the adjacent pans. It will be observed that, when assembled, the side walls 31 of each pan overlapping portion are seated in material-sealing relationship upon the corresponding side walls of the adjoining, underlapping, pan portion. The only portions needing a sealing strip therefore, are the bottom, lapping portions of the pans.

The sealing strip 46 serves to minimize the escape of fine material which otherwise might find its way between the lapped joints of the pan sections.

Any suitable means may be provided for connecting the pitmans 12 of the shaker mechanism 11 to the trough line 10. In the form shown in Figure 4, the ends 50 of the pitmans 12 are connected by ball-and-socket joints 51 at opposite sides of the pan line to a crosstree 52 which, in turn, is pivotally mounted on an upright stud 53 forming part of an elongated drive bracket 54. Said drive bracket 54 may be longitudinally extended to connect with the side frame members 15 for a considerable length of the pan line; as for instance in Figure 1, said bracket extends about the length of two pan sections 16.

Although the novel form of trough structure has been described in connection with a shaker conveyor, for which it is particularly adapted, it will be understood that the same structure can also be employed in inclined chutes and the like.

The use and operation of the device may now be described as follows:

The pan line 10 is set up for reciprocal movement on the supporting rollers 22 and with the shaker mechanism 11 operatively connected with the side frame members 15 of the trough line. The pan sections 16, 16 are connected to the continuous side frame members 15 with one end of each individual pan section positively secured or anchored to the side frame members, and with the opposite ends of each pan section having a lapped joint with the next section, so as to permit limited longitudinal sliding or telescoping movement between adjacent pan sections. The shaker motion is preferably imparted to the pan line in the direction to move the material along the pan line from left to right, so that the material will ride over the lapped joints without obstruction.

The pan sections are preferably made of relatively thin metal, whereas the side frame members are made of comparatively heavy cross-sectioned metal, extending the full length of the conveyor to carry substantially all the longitudinal stresses incident to the shaking motion imparted thereto by the shaker mechanism. This construction affords minimum weight with maximum strength, and also permits materials of relatively high temperature, such as slag, molding sand or the like, to be transported along the pan line, without causing any buckling or other distortion

due to wide variations in temperature which occur from time to time and at different points along the pan line. Such temperature variations will usually affect the pan sections 16, 16 more than the side frame members 15, since said pan sections are made of lighter material, and also are brought into more direct contact with the material being transported along the conveyor. The pan sections are so arranged that they readily accommodate themselves to such expansion or contraction at various localized points along the pan line as may be required.

The pan sections are also connected along their flanged upper edges to the side frame members so that much of the heat effective directly on the pan sections will tend to be dissipated before it reaches the side frame members by conduction. As a result, the side frame members are not ordinarily subjected to the same extremes of heat as the individual pan sections.

Although I have shown and described certain embodiments of my invention, it will be understood that I do not wish to be limited to the exact construction shown and described, but that various changes and modifications may be made without department from the spirit and scope of the invention as defined in the appended claims.

I claim:

1. In a trough structure, an elongated substantially rigid supporting frame, and a plurality of pan sections mounted in load-carrying sequence along said frame, means for positively anchoring a relatively limited area of each of said pan sections in substantially rigid relation to said frame, with the remaining area of such pan section free for longitudinal expansion or contraction relative to said frame, and with a relatively free end of such pan section in lapped relation to an adjoining pan section.

2. A trough structure in accordance with claim 1, wherein successive pan sections are each anchored adjacent one end to the frame and with the opposite relatively free end in overlapping relation with the anchored end of the next pan section.

3. A trough structure in accordance with claim 1, wherein each pan section has generally upright side walls and the frame includes two laterally spaced side frame members disposed along opposite sides of a plurality of said pan sections and having the latter anchored thereto along the upper edges of their side walls.

4. A trough structure in accordance with claim 3, wherein the frame also includes a plurality of longitudinally disposed cross members connecting said side frame members in supporting relation below the lapped joints between adjoining pan sections.

5. A trough structure in accordance with claim 3, wherein the side walls of the trough sections each have outwardly extending flanges along their upper edges which are anchored to the side frame members near one end of such trough section and are secured adjacent their opposite ends for limited longitudinal slidable movement relative to similar flanges on the adjoining pan section and to said side frame members.

LOY D. HAGENBOOK.

References Cited in the file of this patent

UNITED STATES PATENTS

Number	Name	Date
2,268,638	Bigelow	Jan. 6, 1942
2,299,005	Bigelow	Oct. 13, 1942
2,333,338	Rapp	Nov. 2, 1943
2,523,293	Hagenbook	Sept. 26, 1950