

May 17, 1949.

E. A. LERNER

2,470,253

CONVEYER CARRIER BLADES WITH EQUALIZER TOPS

Filed June 8, 1946

3 Sheets-Sheet 1

Fig.1

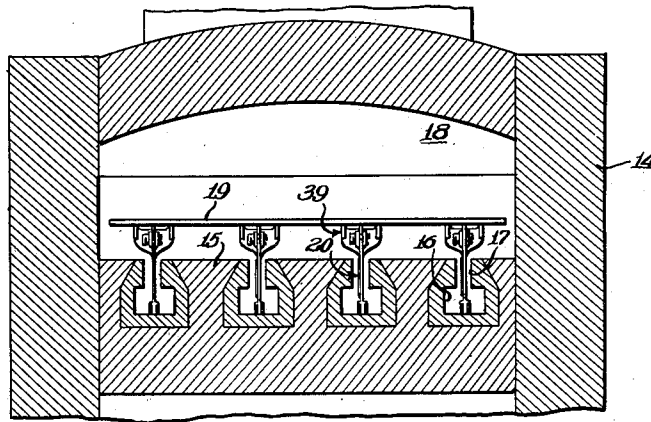


Fig. 2

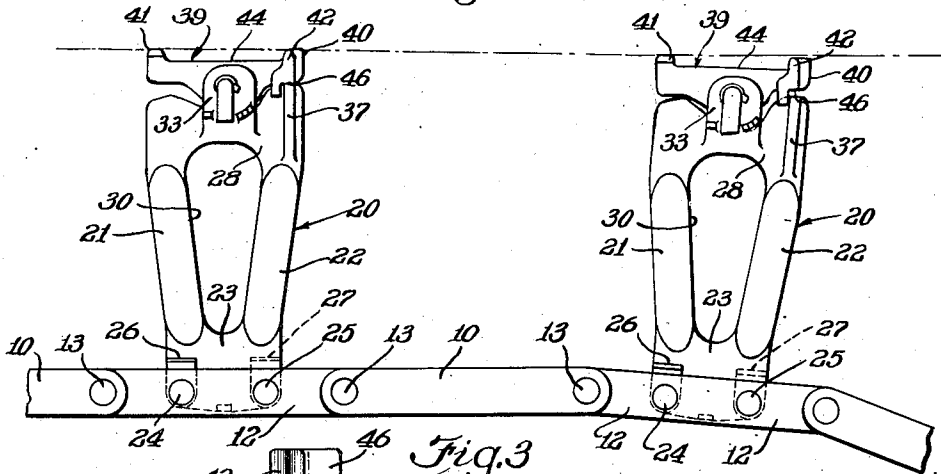
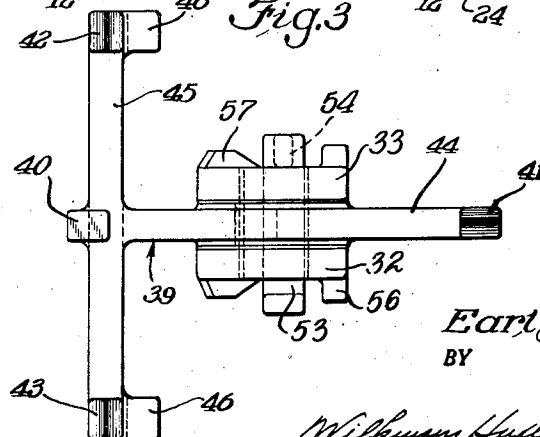


Fig. 3



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3 Sheets-Sheet 2

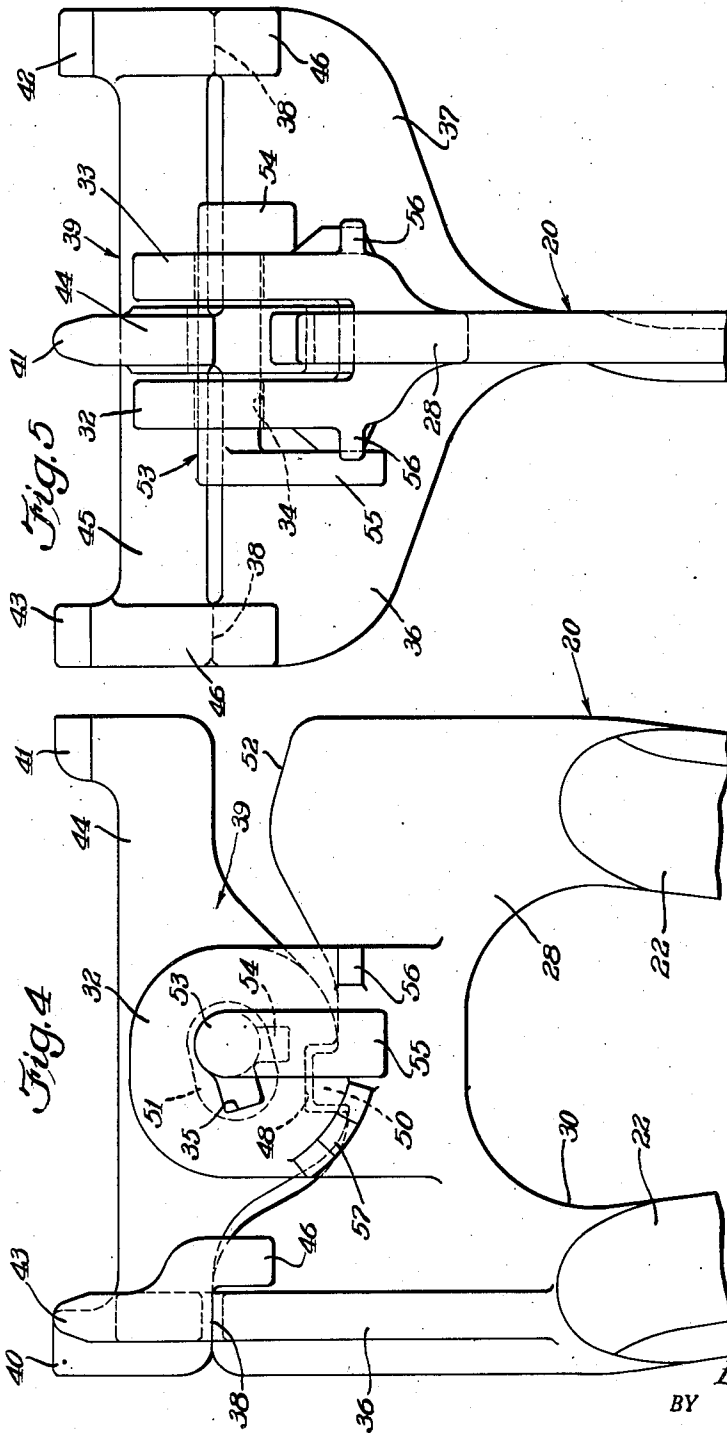
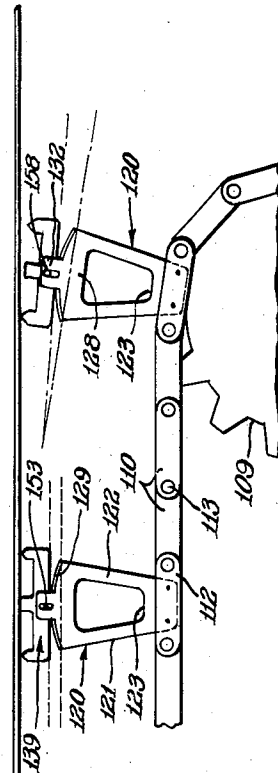


Fig. 6

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3 Sheets-Sheet 3

Fig. 7

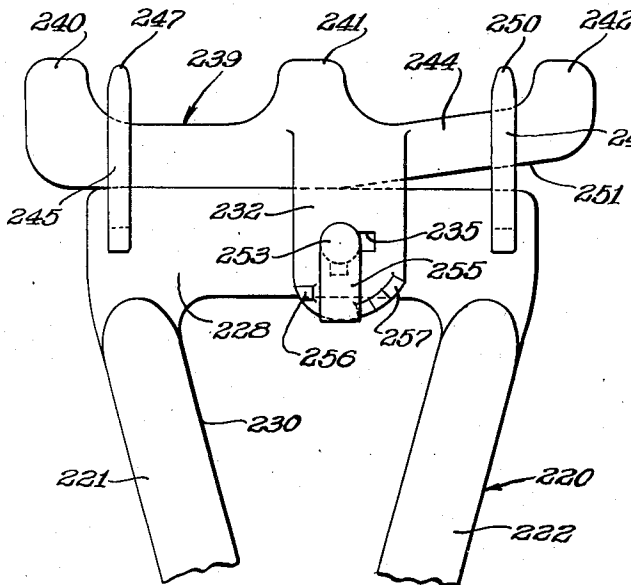


Fig. 8

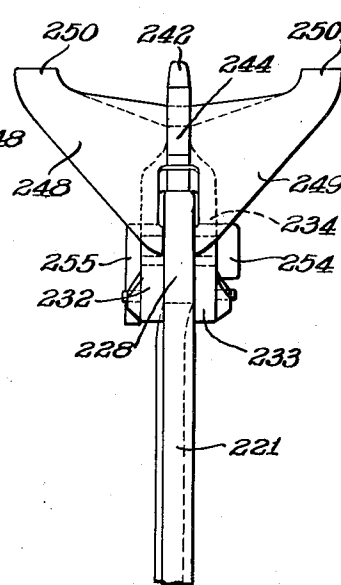
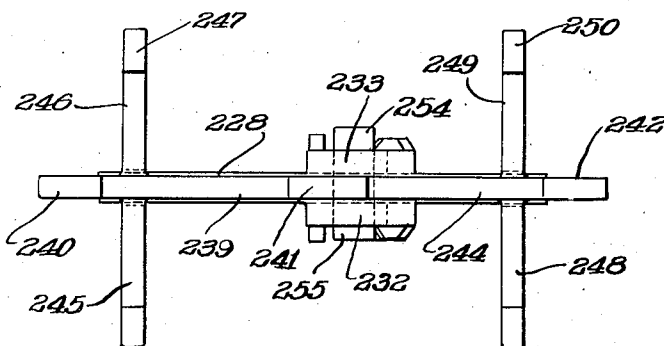


Fig. 9



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CONVEYER CARRIER BLADES WITH
EQUALIZER TOPS

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11 Claims. (Cl. 198—189)

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The invention relates to endless chain conveyors for moving metal sheets and like articles through a furnace for progressive heating and has reference in particular to improvements in the supporting members or carrier blades for said articles, a plurality of which at suitably spaced intervals are presented within the furnace by an endless chain conveyor having movement in a passage provided therefor in the hearth of the furnace.

Many types of carrier blades have been designed for endless chain conveyors for heating furnaces with the object of providing carriers free from cracking, spalling or distortion, since severe stresses are set up by reason of the unequal heating and cooling as the carrier blades pass through the furnace in one direction and then through the cooler outside atmosphere in a return direction. Although the improvements in the art have met with some success, because of the rapid deterioration of the parts disposed within the heating chamber, maintenance of the carriers in operative condition has required replacement of an entire individual carrier blade from time to time, thus greatly increasing costs due to such changes.

In my Patent No. 2,279,689 granted April 14, 1942 I disclose and claim a carrier blade of multi-part construction wherein the parts are conveniently connected together and wherein the members which are particularly subject to deterioration can be readily and easily repaired or replaced when necessary.

An object of the present invention is to improve the multi-part carrier blade construction shown in my prior patent by articulately connecting the article supporting members to their particular carrier blade members with provision being made for limited rocking movement of the article supporting members.

During operation of endless chain conveyors of the type described the upright carrier blades travel within slotted conduits constructed in the hearth of the furnace and the article supporting members connected thereto are positioned above the hearth for supporting the metal sheets or similar articles within the heating chamber, for which purpose the said members are provided with a plurality of spaced upstanding fingers. The carriers are caused to leave the furnace when their particular conveyor link contacts the end sprocket. As a result the carrier blades are inclined at an angle to the vertical and a finger of the article supporting member of said carrier is accordingly forced upwardly so that an excessive load is thus placed on it. In conven-

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tional carrier blade construction this action had a tendency to bend or distort the upstanding supporting blade which is at a high temperature due to its travel through the heating chamber, the distortion taking place to such an extent as to require replacement. In the improved structure of the invention the article supporting members have pivotal securement to their carrier blades, thereby permitting the members to rock or pivot to a limited extent so as to equalize the load placed upon the carrier blades as they leave the heating chamber.

Another object of the invention resides in providing a novel carrier blade of multi-part construction wherein the top part or article supporting member is constructed and arranged to resemble an equalizer bar and wherein the same has pivotal connection with the lower part or carrier blade so that an excessive load placed on the article supporting member will be transmitted through the pivot axis to the carrier blade.

A further and more specific object resides in providing an equalizer top of novel construction and which is desired for pivotal securement to its carrier blade with provision being made for limited rocking movement of the equalizer top on said blade.

With these and various other objects in view, the invention may consist of certain novel features of construction and operation as will be more fully described and particularly pointed out in the specification, drawings and claims appended hereto.

In the drawings which illustrate an embodiment of the invention and wherein like reference characters are used to designate like parts—

Figure 1 is a view in cross section of a heating furnace in which is installed endless chain conveyors provided with carrier blades constructed in accordance with the present invention;

Figure 2 is a fragmentary view in side elevation of an endless chain conveyor for use in the furnace shown in Figure 1 and which embodies in its construction carrier blades equipped with equalizer tops in accordance with the invention;

Figure 3 is a top plan view of the improved equalizer top and carrier blade comprising the multi-part structure of the invention;

Figure 4 is a fragmentary elevational view on an enlarged scale showing details of the pivotal securement of the equalizer top to its carrier blade;

Figure 5 is an end view of the structure shown in Figure 4;

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Figure 6 is a view in elevation illustrating another embodiment of the invention;

Figure 7 is a fragmentary elevational view showing details of another modified construction of equalizer top coming within the invention;

Figure 8 is an end view of the structure shown in Figure 7; and

Figure 9 is a top plan view of the modification of Figure 7.

Referring in more detail to the drawings, the multi-part carrier blade structure of the invention is shown in Figure 2 as affixed to endless chain conveyors comprising a plurality of opposed link members 10 and 12 pivotally secured to each other as at 13, with the carrier blades being fixedly secured to the links 12, which links alternate with the links 10. The carrier blades as elements of the endless chain conveyor are associated with a heating furnace such as 14 having a hearth 15. The conveyors are disposed within passageways 16 provided therefor and which extend longitudinally of the hearth with the conduits 17 receiving the carrier members which extend vertically and project into the heating chamber 18. These projecting ends of the carrier members are equipped with the article supporting members, in accordance with the invention, which have contact with and support the metal sheets 19 or other articles and convey the same through the furnace chamber for progressive heating.

As best shown in Figures 2, 4 and 5, the carrier blade of multi-part construction as comprehended by the present invention is shown as comprising a carrier member 20 of open frame-like construction and which includes the opposed supporting elements 21 and 22 interconnected at their lower ends by web 23 which is provided with means such as openings whereby the carrier member can be connected by the rivets 24 and 25 to the opposed link members 12 of the endless chain conveyor so as to form a part thereof. The web 23 is provided with shoulders 26 and 27 on the respective sides thereof for engagement with the link members 12 to position the carrier member with respect to the endless chain conveyor.

The supporting elements 21 and 22 are bridged or interconnected at their upper ends by the web 28, thus providing an opening 30 substantially centrally of the carrier member to prevent undue deterioration of this part of the structure. The said upper interconnecting web 28 is constructed specially for purposes of the invention, having spaced journalling members 32 and 33 formed integrally therewith centrally of the web, and which journalling members project upwardly beyond the body of the web. The members in effect form a bifurcated structure with said members having an opposed relation and being spaced on the respective sides of web 28 a distance slightly greater than the width of the web. A central opening is formed in each journalling member, the same being indicated by numeral 34. The openings are in alignment with each other with each opening having a slot 35 communicating therewith. The web 28 is additionally provided with the web portions 36 and 37 located on the respective sides of the web and projecting laterally therefrom, as best shown in Figures 4 and 5. In the present embodiment the spaced web portions are formed integrally with web 28 and are located directly above the supporting element 22 of the carrier member. On the upper surface of each web portion 36 and 37 and at the outer extremity thereof

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a seat 38 is provided, said seats having utility in supporting the article supporting member which will now be described in detail.

The article supporting member, indicated in its entirety, by numeral 39, provides a plurality of upstanding fingers for contact with the metal sheets or articles which are supported thereby. The longitudinally disposed fingers are indicated by numerals 40 and 41, Figure 2, whereas, the transverse fingers are indicated by numerals 42 and 43. Said member accordingly has a T-formation in plan and wherein the fingers 40 and 41 are joined by the longitudinal body portion 44 and the fingers 42 and 43 are connected by the transverse body portion 45. The finger 40, since it is located in alignment with the body portion 44, may be considered as a part of the same, or the said finger may be considered as forming part of the transverse body portion 45. The fingers 42 and 43 each have a depending part in the form of the lug 46 which is displaced laterally of body portion 45 and in operative position the said lugs have overlapping relation with the web portions 36 and 37 at the extremities thereof adjacent the seats 38.

According to the invention the article supporting member 39 is mounted on its carrier member 20 in a manner permitting limited oscillating movement of the supporting member. For this purpose the longitudinal body portion 44 has a formation providing a depending part for location between the members 32 and 33. The top surface of web 28 is likewise specially formed for accommodating the body portion 44 and in the embodiment herein disclosed the top surface of web 28 is substantially concave, whereas, the body portion 44 has a convex formation providing said depending portion and which has operative association with the concavity. The desired oscillating movement of the article supporting member is made possible by the notch 48 formed in the convex part of the body portion 44 and by the coating projection 50 which extends upwardly from the base of said concavity in the top surface of web 28. This structure has been provided to prevent the article supporting member from sliding out of position when passing over the idler sprocket just prior to being loaded with the material to be conveyed through the furnace.

For the rocking movement of the said member 39 the body portion 44 is provided with the opening 51 which is of oval shape. The location and arrangement of opening 51 is such as to permit the article supporting member to normally maintain a substantially horizontal position, in which position the transverse body 45 is supported by the seats 38 of the web portions 36 and 37. In this position of the member all four fingers are horizontal and metal sheets such as 19 or similar articles can be satisfactorily supported by the fingers and thus conveyed through the furnace horizontally. The member, however, is capable of rocking in a counter-clockwise direction, Figure 2, the extent of this rocking movement being limited by the top surface 52 of web 28, which is purposely reduced in height to provide for this limited rocking movement. Although the opening 51 is necessarily of oval shape to permit said rocking movement of member 39, the movement would not take place in a proper manner were it not for the notch 48 and projection 50. As best shown in Figure 4, the coaction of these parts is such as to provide a fulcrum to facilitate rocking of the article supporting member.

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The parts of the present carrier blade are maintained in articulated relation by the retaining pin indicated in its entirety by numeral 53. The pin is of the key-lock type having depending elements at its respective ends. One element comprises the lug 54, identical in shape to the slot 35. The function of the slot is to permit the retaining pin to be passed through the journalling members 32 and 33 which can be readily accomplished when the lug 54 is aligned with said slots 35. The other depending element of the pin comprises the lever 55 which assists in retaining the pin in place by locating lug 54 vertically and thus out of alignment with slots 35. The said lever 55 has location between stops 56 and 57 formed integrally with journalling member 32. Journalling member 33 is provided with similar stops so that the retaining pin for practical purposes can be reversed in position.

In the formation of the carrier blade members according to the present disclosure due consideration has been given to providing suitable metal sections throughout for facilitating foundry practice so that the members can be produced free from flaws, cracks or other objections which would accelerate failure in use by reason of the high and low temperature to which the parts are alternately subjected.

Furthermore, the carrier blade of the invention is provided with an articulated top member which has rocking movement on its carrier member to avoid overloading of one side of the same with consequent bending and distortion of the member. By means of the top part being made separately and arranged to assemble an equalizer bar, the multi-part carrier blade will carry the same load as if the carrier blade had been constructed in one piece. The equalizer top functions to equalize the load transmitted to the carrier member. The same is transmitted from the equalizer top to the carrier member through the pivot axis and as a result the load is taken by the carrier member in a manner which substantially eliminates distortion and bending which took place in the one-piece structures heretofore employed in heating furnaces. It will be appreciated that the result herein described with respect to Figures 2, 3, 4 and 5 could be accomplished by obvious slight modifications to the present design. Provided the load is carried by a pin at the center of the articulated parts, allowing the top to equalize the load, the objectives may even be accomplished with an elimination of the rolling action.

In Figure 6 a modified form of the invention is disclosed wherein the design of the parts has been materially simplified. The forward sprocket 109 has operative connection with an endless chain conveyor consisting of opposed link members 110 and 112 and which are pivotally secured to each other as at 113. The link members 112 have suitably secured thereto a carrier blade of multi-part construction as comprehended by the present invention, the same comprising a carrier member 120 of open frame-like construction including opposed supporting elements 121 and 122 which are interconnected at their base by web 123 and at their upper ends by web 128. In this modification the web 128 has an arcuate top surface indicated by numeral 129. The web 128 also provides spaced journalling members 132. The top member 139 in the form of an equalizer bar, substantially similar to that described in the device of Figure 2, is pivotally secured to the carrier member by means of retaining pin 153. The pin is suitably retained in operative position and

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a substantially vertical slot 158 is formed in the equalizer top to permit rocking movement of the same. Said movement is diagrammatically illustrated in Figure 6. It will be observed that the carrier member is inclined upon engagement with the forward sprocket 109, which action takes place when the carrier blade is about to leave the furnace. As a result of the pivotal connection of the equalizer tops with their respective carrier members each top has rocking movement upon inclination of its carrier member and the load is transmitted by the top to its member through the pivotal axis in a manner to substantially equalize the load and eliminate bending or distortion of the member.

The modification shown in Figures 7, 8 and 9 consists of a carrier member 220 of open frame-like construction and including opposed supporting elements 221 and 222 interconnected at their lower ends by a web, not shown, which, however, has been fully described and explained in connection with the disclosure of Figure 2. The upright supporting elements 221 and 222 are bridged or connected at their upper ends by the substantially horizontal web 228, the structure thus providing a central opening 230 to prevent undue deterioration of these supporting elements. An article supporting member, indicated in its entirety by numeral 239, is supported for rocking movement on the top surface of the web 228. The member consists of a longitudinal body portion 244 and which provides upstanding article supporting fingers 240, 241 and 242, the top edges of the fingers being disposed in a horizontal plane with member 239 in the position as shown in Figure 7. The left hand end of the longitudinal body portion 244 is provided with laterally extending webs 245 and 246, which webs likewise provide article supporting fingers 247. The webs depend from the body portion so as to form spaced portions disposed on the respective sides of web 228, it being observed that the connecting web 228 is adapted to fit between portions 245 and 246. A similar construction is found at the right hand end of the body portion 244 wherein the webs 248 and 249 are integral with the body portion, extending upwardly to form the fingers 250 and depending to form spaced portions located on the respective sides of web 228. This end of the body portion 244 is bevelled on its undersurface at 251, the bevel extending from the edge adjacent finger 242 to substantially the center of the article supporting member immediately below the central finger 241. As a result of the bevelled surface the article supporting member has rocking movement on web 228. The rocking movement is limited in both directions, as, for example, when the parts are in contact, as shown in Figure 7, which positions fingers 240, 241 and 242 in horizontal alignment for supporting metal sheets or articles as has been described, and when the surface 251 is in contact with web 228. When this movement has taken place the fingers 240, 241 and 242 are at an inclination for purposes as has been described in connection with the other modifications. There is no opposition provided by the portions 245, 256 and 248, 249, but, on the contrary, these portions are disposed on respective sides of the web 228 and function as guiding elements during the rocking movement of the article supporting member.

The member 239 is especially constructed for purposes of the invention, having depending journalling members 232 and 233 formed integrally with the longitudinal body portion 244 of

the member. The journalling members project downwardly from said body portion and in effect form a bifurcated structure, being spaced sufficient to accommodate the web 228. A central opening is formed in each journalling member, the same being indicated by numeral 234. The openings are in alignment with each other and each opening has a slot 235 communicating therewith. The parts are maintained in articulated relation by the retaining pin indicated in its entirety by numeral 253 and which is of the key lock type, having depending elements at its respective ends. One element comprises the lug 254 identical in shape to the slot 235. The function of the slot is to permit the retaining pin to be passed through the journalling members 232 and 233 and which can be readily accomplished when the lug 234 is aligned with the slots 235. The other depending element of the pin comprises the lever 255 which assists in retaining the pin in place. This lever has location between stops 256 and 257.

The construction of the article supporting member comprising the modification of Figures 7, 8 and 9 has certain advantages which result principally from the depending relation of the journalling members 232 and 233. When the journalling members project upwardly their free ends are subjected to the intense heat of the furnace, with the result that they soon deteriorate which requires replacement of the entire supporting structure. For replacing the supporting structure the expense is considerable but since it is contemplated that the article supporting member will need replacement from time to time it is only natural that the journalling members 232 and 233 should be integral with and thus a part of said article supporting member. With this exception the modified structure of Figures 7, 8 and 9 is the same as has been described, the necessary fingers and webs being provided for obtaining adequate strength and the necessary supporting surface, with the locking pin journalling the articulated article supporting member in the conventional manner.

The invention is not to be limited to or by details of construction of the particular embodiment thereof illustrated in the drawings, as various forms of the device will of course be apparent to those skilled in the art without departing from the spirit of the invention or the scope of the claims.

What is claimed is:

1. A material carrier for conveyors for heat treating furnaces, in combination, a carrier member secured to a conveyor, an article supporting member articulately connected to said carrier member, and means provided by said members for limiting the pivotal movement of the article supporting member on the carrier member, the said means provided by the carrier member including seats for contact with the article supporting member to support the said member in an operative substantially horizontal position.

2. In a conveyor for heat treating furnaces, the combination including a carrier member secured to said conveyor, said carrier member having an open frame-like construction embodying spaced upright supporting elements and a connecting web therebetween, an article supporting member supported by said connecting web, and means for articulately connecting the article supporting member and said carrier member whereby said article supporting member may

have oscillating movement on the carrier member from a horizontal position to an angular position with respect to the horizontal.

3. A conveyor for heat treating furnaces as defined by claim 2 wherein the means for articulately connecting the members includes a releasable pin, and wherein said carrier member provides stop means for limiting the oscillating movement of the article supporting member.

4. In a conveyor for heat treating furnaces, the combination including a carrier member having means for securing it to said conveyor, said carrier member having an open frame-like construction embodying spaced upright supporting elements and a connecting web therebetween, spaced journalling members integral with and extending above said web, an article supporting member supported by said connecting web and having location between the journalling members, a retaining pin articulately connecting the article supporting member to said journalling members, said article supporting member having a pivot opening of special shape for receiving the pin whereby limited oscillating movement of said member may take place, and means provided by the carrier member including seats for contact with the article supporting member to support the said member in an operative substantially horizontal position when located at one extremity of its oscillating movement.

5. In a conveyor for heat treating furnaces, the combination including a carrier member having means for securing it to said conveyor, said carrier member having an open frame-like construction embodying spaced upright supporting elements and a connecting web therebetween, spaced journalling members integral with and extending above said web, an article supporting member supported by said connecting web and having location between the journalling members, a retaining pin articulately connecting the article supporting member to said journalling members, said article supporting member having a pivot opening of special shape for receiving the pin whereby limited oscillating movement of said member may take place, and said web and article supporting member having a coacting projection and notch for retaining the parts in proper operative relation during said oscillating movement.

6. In a conveyor for heat treating furnaces, the combination including a carrier member having means for fixedly securing it to said conveyor, said carrier member having an open frame-like construction embodying spaced upright supporting elements and a connecting web therebetween, the upper surface of said web being concave centrally thereof and which provides stop means on the respective sides of the concavity, spaced journalling members integral with and extending above the web on the respective sides thereof in substantial alignment with the concavity, an article supporting member having a longitudinally disposed body portion and a plurality of upstanding fingers, said body portion having a bottom surface of convex form and being adapted for location between the journalling members whereby the body portion is received by the concavity for supporting the article supporting member in a manner permitting oscillating movement on said connecting web, a retaining pin articulately connecting the article supporting member and said journalling members, and said article supporting member having a

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pivot opening of special shape for receiving the pin whereby oscillating movement of the member may take place to an extent limited by the stop means provided by said web.

7. In a conveyor for heat treating furnaces, the combination including a carrier member having means for fixedly securing it to said conveyor, said carrier member having an open frame-like construction embodying spaced upright supporting elements and a connecting web therebetween, the upper surface of said web being concave centrally thereof and which provides stop means on the respective sides of the concavity, spaced journalling members integral with and extending above the web on the respective sides thereof in substantial alignment with the concavity, an article supporting member having a longitudinally disposed body portion and a plurality of upstanding fingers, said body portion having a bottom surface of convex form and being adapted for location between the journalling members whereby the body portion is received by the concavity for supporting the article supporting member in a manner permitting oscillating movement on said connecting web, a retaining pin articulately connecting the article supporting member and said journalling members, said article supporting member having a pivot opening of special shape for receiving the pin whereby oscillating movement of said member may take place to an extent permitted by the stop means provided by said web, and said web and body portion of the article supporting member having a coacting projection and notch for retaining the parts in proper operative relation during said oscillating movement.

8. In a conveyor for heat treating furnaces, the combination including a carrier member having means for securing it to said conveyor, said carrier member having an open frame-like construction embodying spaced upright supporting elements and a connecting web therebetween, an article supporting member in contact with said connecting web being supported thereby and having rocking movement with respect to the web, spaced journalling members integral with the article supporting member and depending therefrom on respective sides of said connecting web, and a retaining pin articulately joining the said journalling members and the connecting web.

9. In a conveyor for heat treating furnaces, the combination including a carrier member having means for securing it to said conveyor, said carrier member having an open frame-like construction embodying spaced upright supporting elements and a connecting web therebetween, an article supporting member in contact with said connecting web being supported thereby and having rocking movement with respect to the web, spaced journalling members integral with the article sup-

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porting member and depending therefrom on respective sides of said connecting web, a retaining pin articulately joining the said journalling members and the connecting web, said article supporting member having a special shape to provide for said rocking movement and also having formed integral therewith a plurality of upstanding fingers for direct contact with the article to be supported thereby.

10. In a conveyor for heat treating furnaces, the combination including a carrier member having means for securing it to said conveyor, said carrier member having an open frame-like construction embodying spaced upright supporting elements and a connecting web therebetween, said connecting web having a flat top surface and which is disposed substantially horizontal when the said carrier member is vertically positioned, an article supporting member including a longitudinal body portion providing a plurality of article supporting fingers, said article supporting member being supported with the longitudinal body portion thereof in contact with said connecting web and being adapted to have rocking movement with respect to said web, journalling members integral with the longitudinal body portion extending on the respective sides of the same and depending so as to have location on the respective sides of said web, and a retaining pin articulately connecting the said journalling members and the connecting web.

11. In a conveyor for heat treating furnaces, the combination including a carrier member having secured relation with said conveyor, said carrier member having an open frame-like construction embodying spaced upright supporting elements and a connecting web therebetween, an article supporting member in superposed relation on the carrier member being supported by the connecting web for rocking movement thereon, means articulately connecting the article supporting member and the carrier member including spaced journalling members and a releasable pin carried thereby, said article supporting member and said web having a special shape to provide for said rocking movement, and the article supporting member having a plurality of upstanding fingers formed integral therewith for direct contact with the article to be supported thereby.

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Number	Name	Date
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