Dec. 4, 1945. J. R. NALBACH 2,390,455

BAKE OVEN CONVEYER

Filed Oct. 26, 1944 2 Sheets-Sheet 1

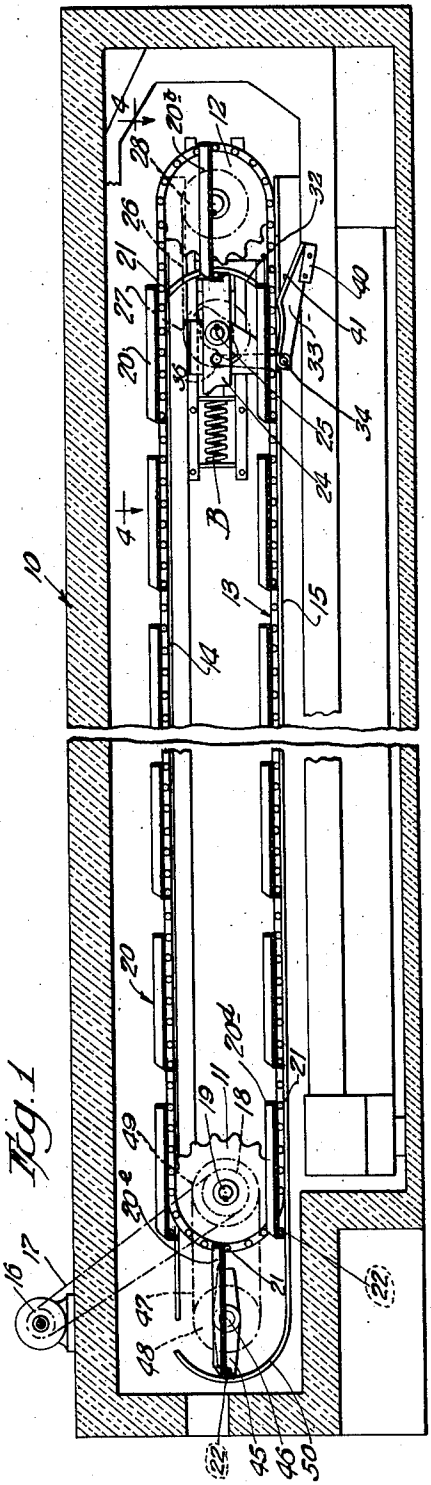


Fig. 1

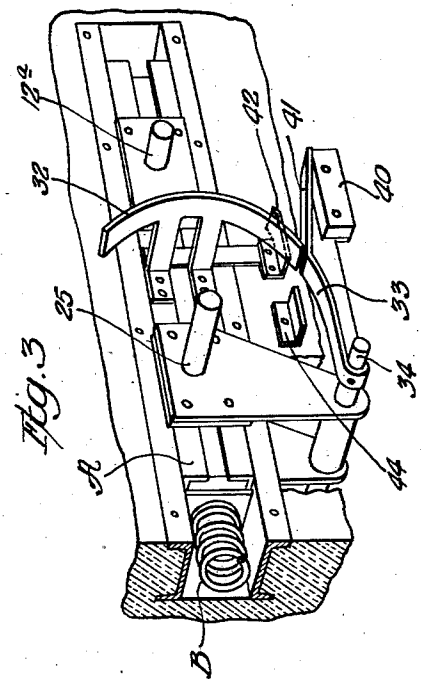


Fig. 3

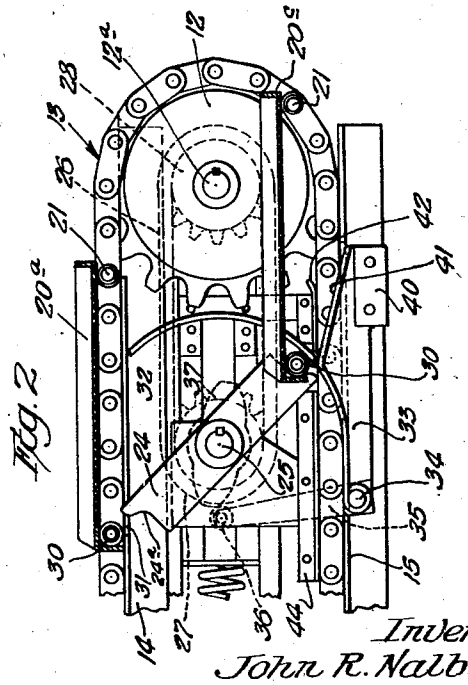


Fig. 2

Inventor:
John R. Nalbach
By: Sheridan, Ross & Cargill
Attys.

Dec. 4, 1945. J. R. NALBACH 2,390,455

BAKE OVEN CONVEYER

Filed Oct. 26, 1944 2 Sheets-Sheet 2

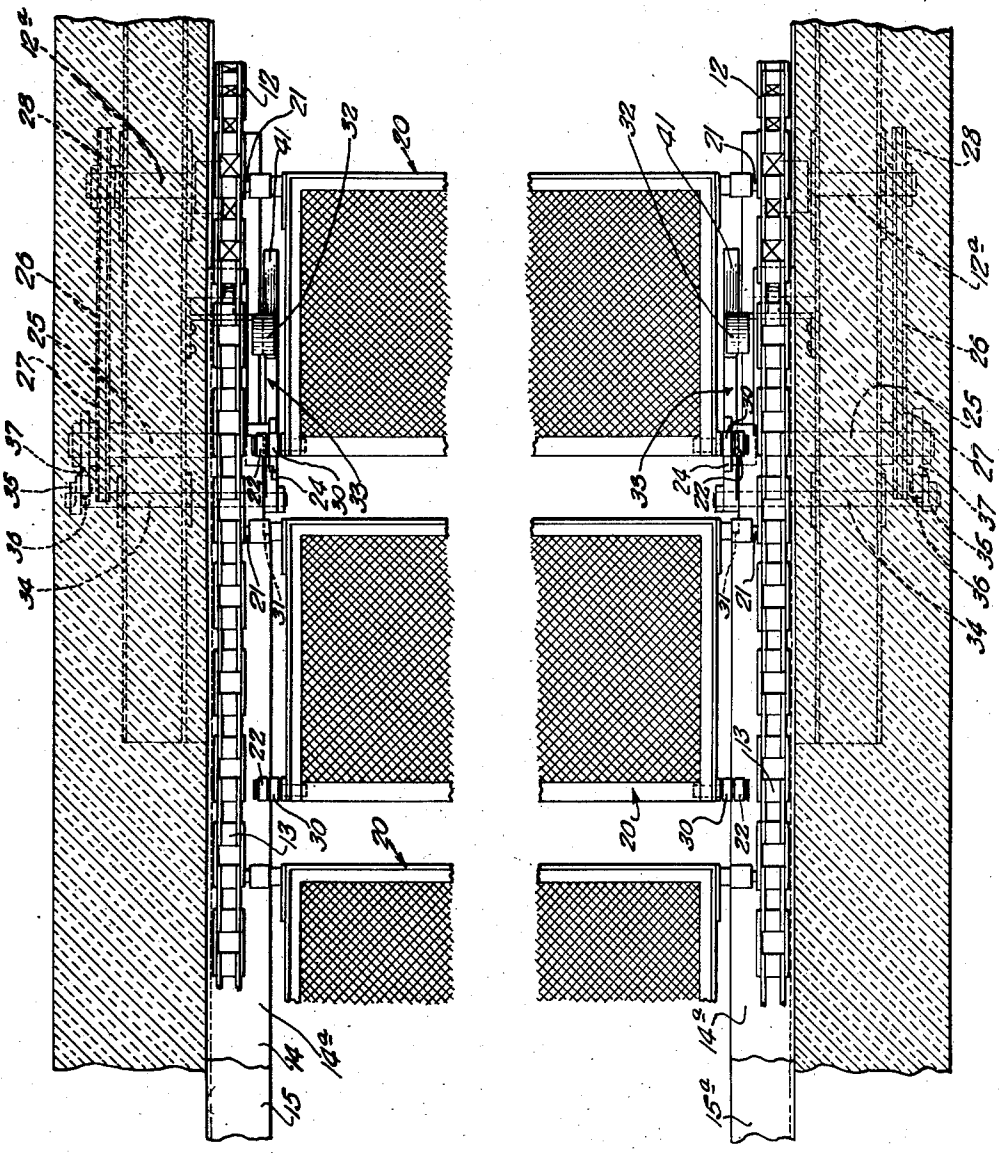


Fig. 4

Inventor:
John R. Nalbach
By: Sheridan, Davis & Cargill
Attys.

Patented Dec. 4, 1945

2,390,455

UNITED STATES PATENT OFFICE

2,390,455

BAKE OVEN CONVEYER

John R. Nalbach, Oak Park, Ill., assignor to Middleby-Marshall Oven Company, Chicago, Ill., a corporation of Illinois

Application October 26, 1944, Serial No. 560,467

6 Claims. (Cl. 198—138)

This invention relates to improvements in bake oven conveyers.

In the conveyer construction for bake ovens, shown in John R. Nalbach and Adolph Haupt application, Serial No. 435,774, filed March 23, 1942, now Patent No. 2,369,840, granted February 20, 1945, there is shown tray stabilizing mechanism, including track switches, for directing unpivoted ends of trays across gaps or spaces between horizontal lower main tracks and superjacent arcuate tracks, along the latter of which said unpivoted ends of the trays travel in moving from one run of the conveyer to the other, the track switches being cam controlled.

The principal object of the present invention is to improve the track switch and related structure shown in said patent by incorporating therein means for preventing jamming of the moving conveyer or tray parts with the track switches in the event the latter fail to move out of obstructing position, due to failure or improper functioning of the cam controlled means thereof.

Another object of the invention is to provide a simple track switch structure that is operable to an open switch position by those approaching portions of the tray conveyer mechanism that will cause jamming of the mechanism in the event the switch structure, due to interference with the proper functioning of the switch operating means, fails to return normally to the open switch position.

Other objects of the invention relate to various features of construction and arrangement of parts which will be apparent from a consideration of the following specification and accompanying drawings wherein

Figure 1 is a longitudinal vertical broken sectional view of a bake oven provided with a conveyer mechanism which is illustrative of the present invention;

Figure 2 is a broken enlarged vertical sectional view of the right-hand portion of the conveyer shown in Figure 1;

Figure 3 is a broken perspective view illustrating portions of the track switch and related mechanism;

Figure 4 is a broken top plan view of the conveyer, partially in section, taken along lines 4—4 of Figure 1.

In the drawings, 10 indicates generally a heat-insulated bake oven enclosure which may be of any approved construction and within which is located the improved conveyer. The conveyer mechanism, generally, comprises a pair of forward sprockets 11, spaced apart horizontally, and a pair of aligned rear sprockets 12, around which pass a pair of chains 13. The runs of the chains between the front and rear sprockets 11 and 12 are shown in horizontal position and are supported in such position by means of a pair of upper tracks 14 and a similar pair of lower tracks 15, the tracks being attached to the inner walls of the oven structure or to the framework thereof. As shown in Figure 1, the conveyer mechanism may be operated by means of a motor 16 located exteriorly of the oven, the motor operating chains 17 which, in turn, drive sprockets 18 mounted on axially aligned stub shafts 19 which carry the front sprockets 11. The shafts 19 extend through opposite walls of the oven to the exterior, whereby the driving means for the conveyer are not subjected to the intense heat of the oven.

The chains 13 carry trays, each indicated by the numeral 20, although to some of the latter letter exponents will be added for clarity in reference to particular trays as the disclosure proceeds.

The trays carry the bread or other bakery products to be baked, and in the particular embodiment herein illustrated the trays are attached pivotally to opposed portions of the chains 13 by lateral extensions or pivot members 21, as indicated in Figure 4. In Figure 4 it will be noted that the tracks 14 and 15 extend inwardly of the oven beyond the chains 13 and thus provide inner trackways along the inner edges of the tracks which are indicated by numerals 14a and 15a. The pivot members 21 extend across the trackways just mentioned into pivotal engagement with the chains and, hence, are moved with the chains as the latter travel under the driving action of the motor 16. The forward ends of the trays 20, as shown in Figure 4, are provided with supporting means therefor in the form of rollers 22 which are arranged for support on the trackways 14a and 15a on the upper and lower tracks 14 and 15. It will be seen, therefore, that the trays 20 are supported in horizontal relation as the same move longitudinally in one direction or other within the oven.

Referring to Figure 1, it will be seen that if the conveyer mechanism is operating in clockwise direction, the pivotal axis 21 of the respective trays in the upper run of the conveyer will be moved arcuately by the chains about the rear sprockets 12 and thus will be carried from the upper tracks to the lower tracks. For the purpose of supporting the forward ends of such trays during the arcuate movements thereof from

one run of the conveyer to the other, mechanism is provided for engaging the forward unpivoted ends of the trays and retaining the same in horizontal alignment with the rear pivoted ends thereof during such arcuate movement. The mechanism herein shown and also disclosed in the above mentioned patent comprises a pair of rotary transfer members **24** each of which is mounted on one of two similar stub shafts **25** (see Figure 4) that are driven in synchronism with the sprockets **12** by any suitable mechanism, such as chains **26**, sprockets **27**, and sprockets **28**, the latter being mounted on the stub shafts **12***a* that carry sprockets **12**, said driving mechanism being located exteriorly and on opposite sides of the baking chamber.

The transfer arms **24**, as shown in Figure 4, are located substantially in vertical alignment with the respective inner edge portions of the tracks **14** and **15** and, by reason of the drive mechanism above described, the movements thereof are synchronized with the movements of the successive trays so that as the rear end of a tray, such as tray **20***a*, shown in Figure 2, approaches the rear sprockets **12**, one end of each transfer arm **24** will be in position, as shown in said figure, to engage rollers **30** mounted co-axially with respect to the adjacent rollers **22**. As the rear pivoted end **21** of the tray **20***a* begins its downward arcuate movement about the sprockets **12**, the forward unpivoted end of the tray, supported by the transfer arms **24** will begin to move arcuately downward also, whereby the tray is retained during such arcuate movements in horizontal or stabilized relation.

In Figure 1 a tray indicated by the numeral **20***b* is shown in a position midway between the upper and lower runs of the conveyer. The rear portion of the tracks **14**, as described in the above mentioned patent, are cut away sufficiently as at **31** (see Figure 2) to accommodate the arcuate movement of the forward ends of the tray under the guidance of the transfer arms **24**. For the purpose of cooperating with the transfer arms in the stabilization of the respective trays during the arcuate movement of the latter, arcuate track members **32** are disposed in the vertical planes of the respective transfer arms **24**. The arcuate track members cooperate with the receiving recesses **24***a* of the arms **24** in guiding the rollers **30** during the arcuate movement mentioned. Since the rear pivoted ends of the trays extend laterally beyond the vertical planes of the arcuate track members **32**, the lower ends of the latter terminate above the lower tracks **15**, thereby providing a gap or space between said members. Such gap or space is required to permit the rear pivots **21** of the trays to pass horizontally along the lower track beneath said arcuate tracks **32** after a tray, such as tray **20***e* of Figure **1**, has reached the lower track **15**.

For the purpose of cooperating with the transfer members **24** in guiding the unpivoted ends of the trays across said gaps at the lower ends of the arcuate tracks **32**, track switches **33** are provided which are disposed in the vertical planes of the respective arcuate tracks. The track switches **33**, as shown more clearly in Figure 3, are mounted on stub shafts **34** each of which, on an outer end is provided with a cam follower arm **35** having a cam follower **36** thereon, the latter being actuated by a cam **37** mounted on the respective shafts **25**. The cams **37**, during the operation thereof, rock the arms **35** and the shafts **34** for the purpose of moving the track switches **33** to the switching position shown in Figures 2 and 3. The non-switching position of a switch is shown in Figure 1. While the track switches **33** are in the positions indicated in Figure 1, the pivot extensions **21** at the rear of the respective trays can pass along the lower tracks **15** beneath the lower ends of the arcuate tracks **32**. When the track switches **33** are in the position shown in Figures 2 and 3 they form arcuate extensions of the tracks **32** and thus cooperate with the latter and with the transfer arms in guiding the forward unpivoted ends of the respective trays from the tracks **32** onto the lower tracks **15**, as suggested by tray **20***c* in Figure 2. The cams **37** are arranged to operate the track switches **33** in synchronism with the arcuate movements of the trays from one horizontal run of the conveyer to the other regardless of the direction of movement of the conveyer.

For the purpose of causing the follower arms **35** to tend to swing to the right or clockwise, as viewed in Figure 2, and thereby retain the cam followers **36** in rolling contact with the surfaces of the cams, the switches are biased for clockwise movement, as by means of similar counterweights **40**, one shown in Figure 2. Should the track switches **33**, or either of them, freeze in their bearings, or due to the presence of some obstruction or to the improper functioning of the cam-operated parts on the exterior of the oven, fail to move to the open switch position shown in Figure 1 in properly timed relation with respect to the movement of the pivoted ends of a tray beneath the arcuate tracks **32**, the switches would obstruct the horizontal movement of the pivoted ends of the tray and cause damage to the apparatus. To avoid such damage the track switches shown in the present application are designed to prevent such damage from the cause mentioned and, as will be seen in the drawings, the rear portions of the track switches **33** are provided with inclined cam surfaces **41** which, in the event the track switches fail to move out of the bridging relation between the lower tracks **15** and the lower ends of the arcuate tracks **32**, will be engaged by the pivotal extensions **21** of an approaching tray, thereby forcing the track switches **33** downwardly in a clockwise direction. For the purpose of preventing the cam surfaces **41** of the track switches from effecting elevation of the chains **13** as the pivotal extensions **21** engage said surfaces **41**, guard rails **42** are provided, as shown in Figures 2 and 3, which prevent such upward deflection of the pivots **21** and the associated links of the chains. The guard rails **42** extend inwardly over the adjacent portions of the lower runs of the chains **13** and are shown mounted on the sliding structures A in which the shafts **12**, **25** and **34** are journalled and which structures are biased by springs B for movement to the right for tensioning the chains **13** while accommodating expansion and contraction and wear thereof, as disclosed in the above mentioned patent.

It will be seen that by means of the present improvements, in the event the track switches **33** are not moved by the counterweights **40** out of the switching relation above described to enable the pivotal extensions of the trays to move without obstruction through the switch spaces beneath the tracks **32**, such pivot extensions **21**, by cooperating with the cam surfaces **41**, will move the switches from such obstructing position and thus avoid breakage or damage to the associated parts of the conveyer mechanism.

In the event the conveyer is being operated in

counterclockwise direction as viewed in Figure 2, and the counterweights 40 fail to move the switches 33 out of bridging relation, as by reason of the shafts 34 thereof freezing in their bearings, the switches would tend to elevate the pivoted end of a tray as the pivot members 21 thereof engage the track surfaces of the switches 33. For the purpose of causing the pivot members 21 to force the switches out of their elevated or bridging positions under such conditions, guard rails 44 are positioned above the lower run of the chains 13 and to the left of the arcuate tracks 32 as viewed in Figure 2. These rails 44 may be secured to the respective oven walls and prevent upward deflection of the chains from the lower tracks 15, and hence, should the switches remain in the elevated position as the pivots 21 approach them in moving to the right, the switches will be cammed out of the elevated position by said pivot members and the pivoted ends of the tray will thus not engage the lower ends of the arcuate tracks 32 but will pass through the switch spaces beneath the arcuate tracks 32.

It will therefore be seen that a safety switch mechanism has been provided whereby, in event of failure of the switches to move in proper sequence out of obstructing position to permit horizontal passage along the lower tracks of the laterally extending pivot members 21 of the trays, said members 21, in approaching said switches, will cam them out of such obstructing positions.

At the forward end of the conveyer the structure is similar to that described in the above mentioned patent and comprises transfer arms 45, each mounted on suitable shafts 46, driven from shafts 19 by means of chains 47 passing over sprockets 48 and 49. Arcuate track members 50 constitute in effect forward extensions of the lower tracks 15. As a tray, such as tray 20*d* in Figure 1, in moving to the left approaches the position where the rear pivotal extension 21 thereof begins to move arcuately about the sprockets 11, the transfer arms 45 will have engaged the rollers 22 at the forward ends of the tray and in cooperation with the arcuate tracks 50 will retain the tray in horizontal relation during the subsequent arcuate movement, as indicated by tray 20*e*, in Figure 1. During the transfer arcuately from one horizontal run of the conveyer to the other the mechanism described operates similarly regardless of the direction of rotation of the conveyer, that is, whether the trays in the upper run of the conveyer move to the right or to the left as viewed in Figure 1. Successive trays, in moving to the transfer position at either end of the conveyer, are retained in stabilized relation during the arcuate movements by the rotary transfer members and associated arcuate tracks as described.

While I have shown and described a structure illustrative of the present improvements, I do not wish to be restricted specifically thereto, since variations in the form of the described mechanism may be utilized within the spirit of the present improvements.

I claim:

1. In a tray conveyer mechanism provided with upper and lower tracks, arcuate tracks disposed between said upper and lower tracks and spaced from the latter, track switches movable into said spaces to provide extensions of said arcuate tracks for guiding tray portions across said spaces, means for moving said switches to non-switching position, and means on said switches cooperable with other portions of the trays for moving said switches out of switching position upon failure of said means to move said switches to non-switching position as said other tray portions approach said spaces.

2. In a tray conveyer mechanism provided with upper and lower tracks, arcuate tracks disposed between said upper and lower tracks and spaced from the latter, track switches providing extensions of said arcuate tracks for bridging the spaces between said arcuate tracks and lower tracks for directing tray portions across said spaces, means for moving said switches to said bridging positions, and means engageable by other portions of the trays for moving said switches out of said bridging positions.

3. In a tray conveyer mechanism provided with upper and lower tracks, arcuate tracks disposed between said upper and lower tracks and spaced from the latter, track switches providing extensions of said arcuate tracks for bridging the spaces between said arcuate tracks and lower tracks for directing tray portions across said spaces, means for moving said switches to said bridging positions, and cam means carried by said switches and disposed by the latter in the path of other portions of the trays when the switches are in bridging position for engagement by said other tray portions for moving the switches out of bridging position as said tray portions approach said spaces.

4. In a tray conveyer mechanism comprising endless chains, trays provided with laterally extending pivot members secured to the chains, upper and lower horizontal tracks for supporting horizontal runs of the chains, means for engaging unpivoted portions of the trays for retaining the same in horizontal relation as the trays move in succession from one horizontal run of the chains to the other, said means comprising rotary members and cooperating arcuate tracks disposed between said upper and lower tracks, said arcuate tracks being spaced from said lower tracks to provide passages through which the pivot members of successive trays are arranged to pass in moving along said lower horizontal run, track switch members movable into said spaces to bridge said spaces for cooperation with said rotary members in moving said unpivoted portions of the trays across said spaces, cam means for moving said switches intermittently into said bridging positions in timed relation with respect to the arcuate movements of the successive trays, and means adapted to be operated by said pivot members of said trays to moving the switch members out of said bridging positions as the respective pivot members approach said spaces.

5. In a tray conveyer mechanism comprising endless chains, trays provided with laterally extending pivotal members secured to said chains, upper and lower tracks for supporting said chains, arcuate tracks disposed between said upper and lower tracks and spaced from the latter, track switches providing extensions of said arcuate tracks for bridging the spaces between said arcuate tracks and lower tracks for directing tray portions across said spaces, cam means for moving said switches to said bridging positions, biasing means for moving said switches out of said bridging positions alternately with respect to the movements thereof by said cam means, and means on said switch members engageable by the pivotal members of a tray approaching said spaces for moving said switches out of switching positions

in the event said switches are not so moved by said biasing means.

6. In a tray conveyer mechanism comprising endless chains, trays provided with laterally extending pivotal members secured to said chains, upper and lower tracks for supporting said chains, arcuate tracks disposed between said upper and lower tracks and spaced from the latter, track switches providing extensions of said arcuate tracks for bridging the spaces between said arcuate tracks and lower tracks for directing tray portions across said spaces, means for moving said switches to said bridging positions, biasing means for moving said switches out of said bridging positions alternately with respect to the movements thereof by said cam means, cam portions on said switch members engageable by the pivotal members of a tray approaching said spaces for moving said switches out of switching positions in the event said switches are not so moved by said biasing means, and means for constraining said pivotal members against deflection from the normal paths of movement by engagement with said cam portions.

JOHN R. NALBACH.