June 9, 1953 H. L. HUDSON 2,641,355

BELT UNLOADER FOR CONTROL OF MATERIAL FLOW

Filed March 16, 1949 3 Sheets-Sheet 1

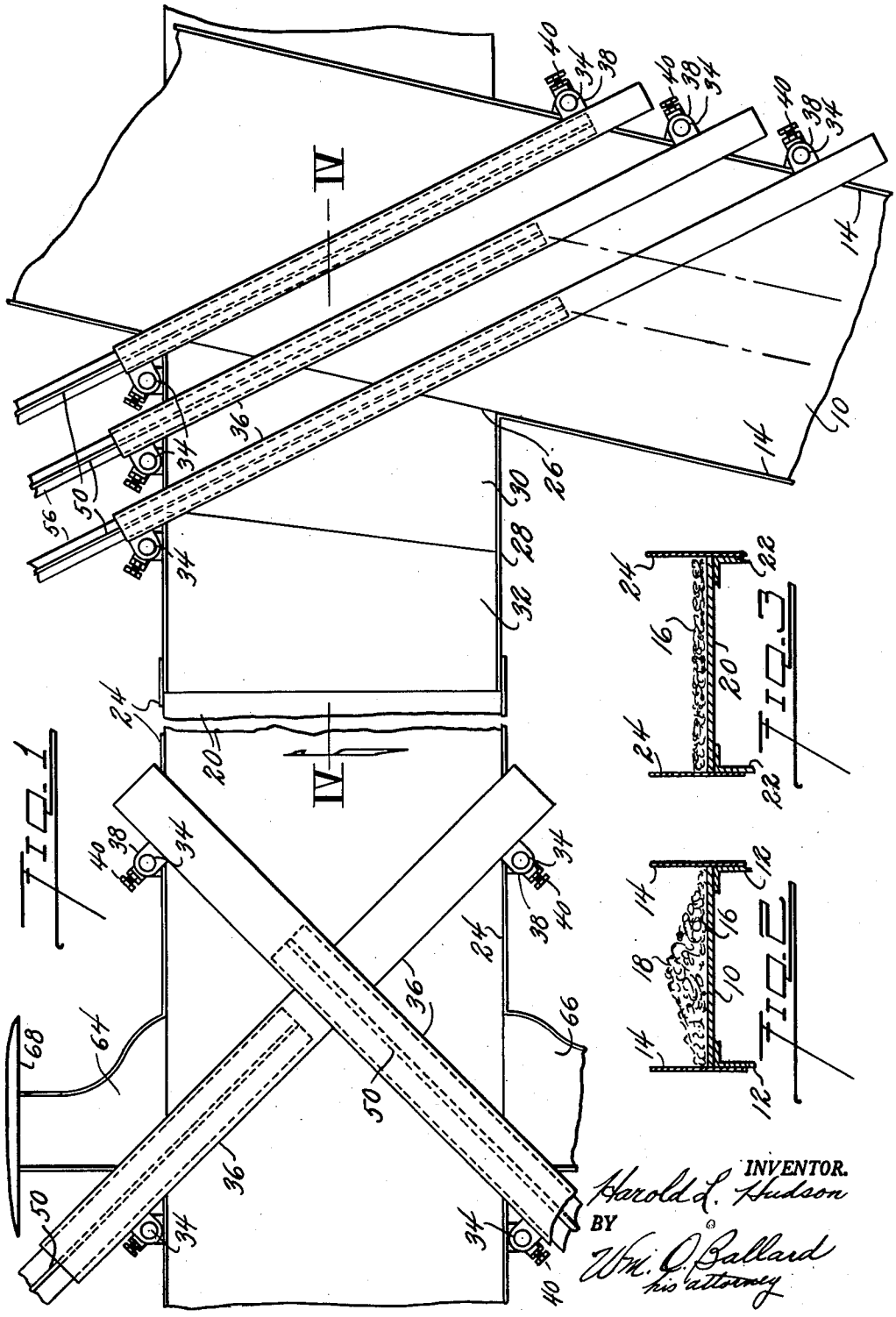


FIG. 1

FIG. 3

FIG. 2

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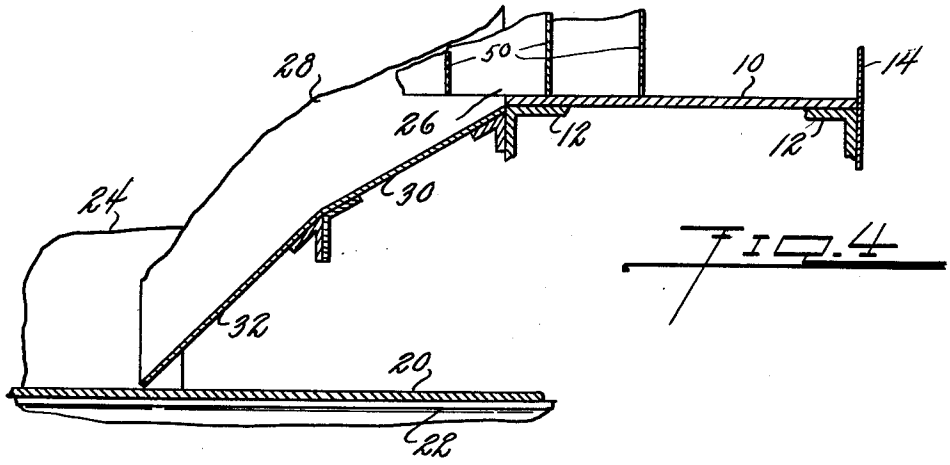


FIG. 4

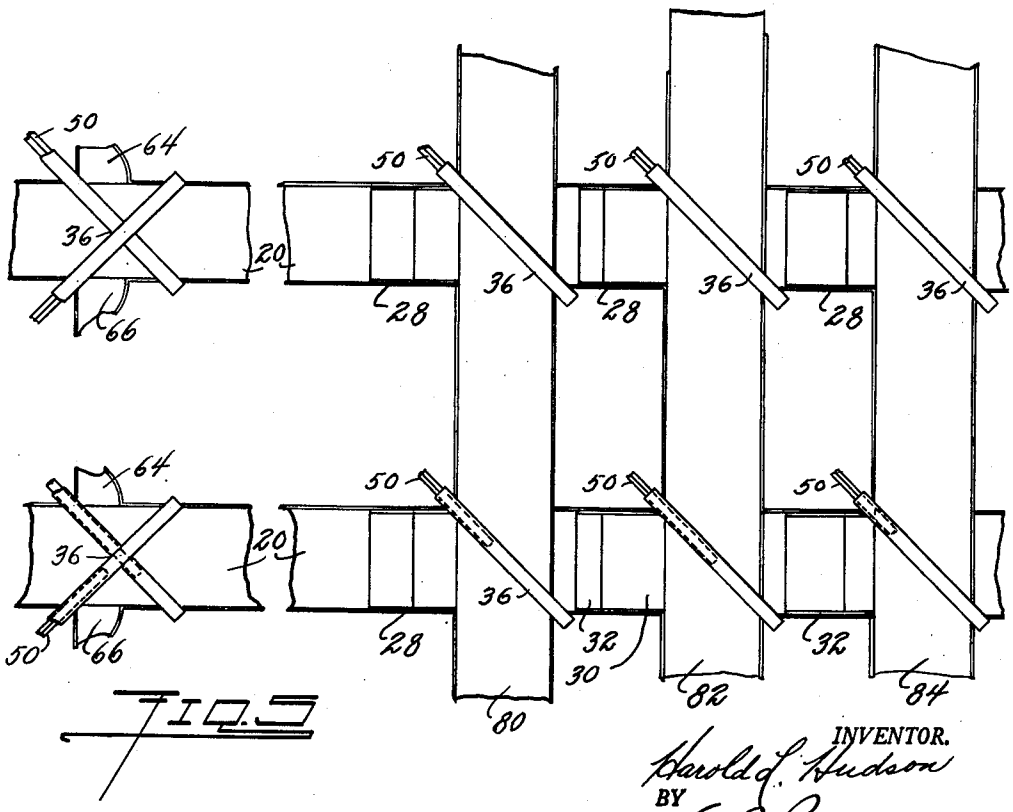


FIG. 3

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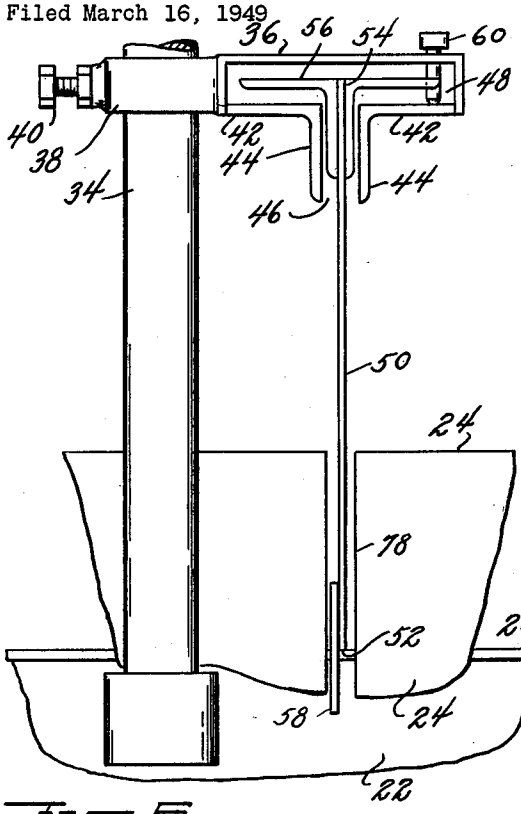


FIG. 6

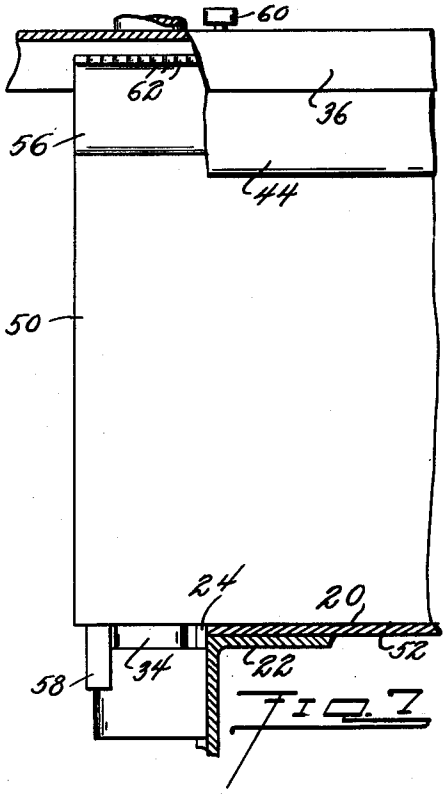


FIG. 7

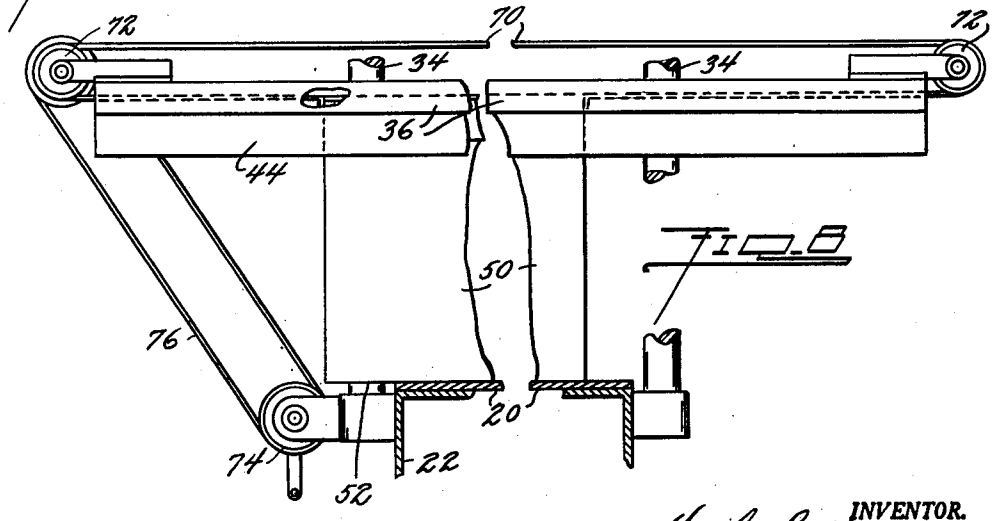


FIG. 8

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BELT UNLOADER FOR CONTROL OF MATERIAL FLOW

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5 Claims. (Cl. 198—188)

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This invention relates to the conveyor handling of material, more particularly to the moving of a stream of the material, accurately subdividing the flow and diverting the sub-divisions into channels leading to further processing, packaging or other disposition.

An object of the invention is to provide a system of conveyors wherein one or more of the conveyors receives a flow of material thereonto in an uneven pile therealong and this flow or stream is transferred to another conveyor and deposited thereon in a transversely evenly distributed stream.

An additional object of this invention is to provide means cooperating with the latter conveyor to sub-divide the evenly distributed stream into smaller streams each having a predetermined volume and weight flow.

A further object of this invention is to provide means for diverting these sub-divided streams from the conveyor to other handling equipment primarily at a rate of flow matching the capacity of the equipment to which the material is supplied.

An additional object of this invention is to provide means for accurately regulating the subdivision of the major flow through simple mechanisms operable during the system operation.

And an additional and important feature of this invention is a combination of two or more of the above features whereby streams of like or different materials may be transported from separate sources, combined, mixed or blended and deposited on one or more conveyors in transversely even sheets of predetermined mixes for further transportation and sub-division and transfer to other equipment.

This invention is a conveyor system useful between the production equipment and the disposition equipment. It is adapted to handle such materials as potato products such as chips, strips and the like, pop-corn, peanuts, candy and the like whereby these articles are received from the kettles or other bulk supply sources, spread in an even layer on one of the conveyors and this controlled stream sub-divided and the sub-divisions diverted to packaging machines at a rate matching the capacity of the packaging machines. Furthermore, as an example, different candies, foods or other articles, may be mixed into a predetermined mix and the mix then delivered to packaging equipment.

Other objects and advantages of this invention relating to the arrangement, operation and function of the related elements of the structure, to various details of construction, to combinations of parts and to economies of manufacture, will be apparent to those skilled in the art upon consideration of the following description and appended claims, reference being had to the accompanying drawings forming a part of this specification wherein like reference characters designate corresponding parts in the several views.

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Referring to the drawings:

Fig. 1 is a plan view of the parts of a conveyor system embodying features of the invention herein;

Fig. 2 is a transverse section through the conveyor unit which initially received the material to be handled, showing a typical material distribution as usually deposited thereon;

Fig. 3 is a transverse section through the conveyor unit receiving the material evenly distributed thereacross ready for a continuously accurate sub-division thereof;

Fig. 4 is a section on the line IV—IV, Fig. 1;

Fig. 5 is a diagrammatic lay-out in plan of a conveyor system, embodying features of the invention herein; the system being particularly adapted to blending or mixing large quantities of materials and delivering a plurality of subdivisions thereof to additional handling stations;

Fig. 6 is an end view of one of the sub-dividing and material diverting blades and its mounting frame;

Fig. 7 is a view of the mechanism of Fig. 6 from the left thereof; and

Fig. 8 is a front elevation of a control blade provided with a modified form of adjusting mechanism therefor.

Conveyor belt 10 is mounted to travel in a substantially horizontal plane along frame 12 between load confining walls. These walls 14 are of a height and extent to confine the particular material to be handled to a predetermined path. This conveyor is preferably positioned to have its load receiving reach adjacent a material source such as the material producing equipment, bulk delivery depot or the like. It is the usual procedure to have the material 16 fed thereon in such a manner that the central region 18 is piled higher than the areas adjacent the walls 14.

At some remote location the first conveyor 10 crosses a second conveyor 20 similarly traveling along a frame 22 between walls 24. This second conveyor's line of travel may be at any angle to the line of travel of the first conveyor, which may be dictated by available space for the installation or some factory plan.

The wall 14 has a clearway 26 therethrough

in the region above the second conveyor so that material from the first conveyor may be diverted therethrough into chute 28 having its floor inclined downwardly from the clearway through a plurality of different angular extents 30, 32, toward the conveyor 20.

The frames 12, 22, have a plurality of vertically extending posts 34 fixed thereon. Selected pairs of the supports 34 mount inverted channel members 36 therebetween to extend in predetermined angular directions across one or both of the conveyors. The mounting elements comprise collars 38 welded or otherwise attached to the sides of the channels 36, which collars surround the posts 34 and are adjustable therealong to be locked at the proper working heights by set screws 40.

In a typical system (Fig. 1) three parallel frame elements 36 are positioned to extend angularly across the conveyor 10 and the chute 28. Additional like frame elements 36 are fabricated into a cross-like frame positioned over the conveyor 20 remote from the chute.

Each inverted channel 36 has mounted therein one side 42 each of a pair of L-angle members having the other sides 44 depending therefrom to form a clearway 46 therebetween and into chamber 48 defined by the channel and the sides 42.

The frames are each provided with a blade 50 having its lower edge 52 floating on the surface of the conveyors. The only vertical support for the blades is their gravity contact on the surface of the coacting conveyor. These blades extend upwardly through the clearways or slots 46 into their respective chambers 48 and may have their upper edges 54 reinforced by coextensive angle members 56 which also serve to add weight to the blades and retain the blades in position in the frames while being mounted. The chamber 36 and slot 46 therefrom are so dimensioned that the blade and its loaded edge is free from any contact therewith when in true vertical position and limit the upward horizontal movement of the blade. The frame merely maintains the blade against falling during the system operation. The frame is primarily a balancing device yet retains and directs the angular positioning transverse the conveyors. The blade may rock and have limited vertical rise and fall as the conveyor passes therebeneath. This enables the blade to slide over belt connectors, material frozen or adhering to the belts, without damage to the working parts.

Each blade is provided with a trigger 58 so that the blade may easily be shifted for movement transversely of the conveyor into its proper adjustment for the particular operation. The transverse setting may be secured by some movement limiting means as for example a simple form of such a mechanism may be a pin 60 extending through the frame member 36 to engage a selected notch 62 along a side of one of the members 48. The pin 60 is lifted, the plate shifted and the pin then dropped into the notch at that time in registry therewith.

Referring to Fig. 1 which represents a system set-up for handling potato chips, pop-corn or the like wherein these materials are received from the production equipment and delivered to packaging machines, the material being fed onto the conveyor 10 moving toward the conveyor 20. As the centrally heaped stream reaches the set of three stream separating and diverting blades, such stream is separated into three sub-streams, each approximately having the same volume flow. This is accomplished by adjusting the blades transversely of the conveyor so that a comparatively narrower central division is separated from the side flows. The central flow being deeper, the volume flow of all three is the same. The sub-streams are diverted into the chute and the plurality of angular inclinations downwardly further tend to create a uniformly even flow onto the conveyor 20.

This even flow is carried by the conveyor 20 to the cross-frame mounted separators which divide the even flow, sweeping or diverting one predetermined portion into chute 64 and the remainder into chute 66. The volume to each chute may be the same or may be different. All the flow may be removed from the conveyor at this separation station or only portions taken with the remainder carried to additional deposit units.

Receivers 68, as for example, packaging machines are supplied by the chutes 64, 66, and this supply is regulated to match the capacity of the individual packaging machine so such machine may operate at peak efficiency at all times. Different capacity machines may be simultaneously supplied from a single conveyor.

In some installations it is advisable to provide other types of blade adjustments. To this end, one form is shown in Fig. 8, wherein the blade 50 is engaged by belt 70 carried about pulleys 72 mounted on a frame 36 and operating mechanism 74 through belt 76 drives the belt 70 for reciprocably moving the blade transversely of its respective conveyor. Slots 78 through the sides 14, 24, are provided at the proper positions along the conveyors to accommodate the blades.

A typical mixing or blending pattern for the conveyor system is shown in Fig. 5. Herein, conveyors 80, 82, 84, each carry a fraction of the mix to be packaged and have a capacity sufficient to supply a member for bulk reception and a number of packaging machines.

The desired portion from each of the conveyors is diverted by a blade 50 into chutes 28, the chutes spreading that portion onto the conveyor 20. The number of ingredients desired may thus be fed onto the conveyor 20 which carries the group to the packaging machines in the manner hereinbefore described. The capacity of the feeding units being large, a plurality of conveyors 20 may be supplied and in turn, each conveyor supply a plurality of packaging machines.

The supports 34 are mounted on the conveyor frames, so that any vibration of the machine, or disturbances externally of the machines will not effect the cooperation between the conveyor and the firmly adjusted yet delicately balanced blades.

It is to be understood that the above detailed description of the present invention is intended to disclose an embodiment thereof to those skilled in the art, but that the invention is not to be construed as limited in its application to the details of construction and arrangement of parts illustrated in the accompanying drawings, since the invention is capable of being practiced and carried out in various ways without departing from the spirit of the invention. The language used in the specification relating to the operation and function of the elements of the invention is employed for purposes of description and not of limitation, and it is not intended to limit the scope of the following claims beyond the requirements of the prior art.

What is claimed and is desired to secure by United States Letters Patent:

1. In a material handling equipment, an endless belt conveyor having its load carrying reach traveling along a substantially horizontal plane, a vertically disposed transverse blade resting by gravity on said conveyor, means for adjusting said blade transversely across said conveyor, and guide means for the transverse adjustment extending along the upper edge of said blade loosely confining said upper edge therein and preventing said blade from rocking out of the vertical beyond predetermined limits.

2. A belt conveyor having its load carrying reach traveling in a substantially horizontal plane, means for diverting all or a portion of the load at an angle off from said reach comprising a transversely and vertically disposed blade resting by gravity on said conveyor, a frame for holding said blade in its relative position on the conveyor, said frame comprising a chamber provided with a slot thereinto through which the upper portion of the blade extends to have its top edge within the chamber, a load for the blade disposed along its upper edge within the chamber, and means along said slot outwardly extending therefrom limiting the horizontal movement of the blade.

3. An endless belt conveyor having a load carrying reach traveling through a substantially horizontal plane, a frame including a support on either side of the reach at different distances therealong, frame construction carried by said support over the reach providing a transversely extending slot above the direction of conveyor travel, and a blade resting by gravity on its lower edge on said reach and having its upper edge loosely disposed with said slot.

4. An endless belt conveyor comprising a frame embodying a substantially horizontal belt support for the load carrying reach thereof, a support extending upwardly from said frame, a

member mounted on said support extending over the reach and providing a slot diagonally extending above and across said reach, and a blade vertically resting by gravity on its lower edge on said reach and having its upper edge loosely disposed within said slot.

5. In equipment for handling a continuing confluent flow of material, a first endless belt conveyor having its load carrying reach traveling along a substantially horizontal plane, a second endless belt conveyor having its load carrying reach traveling below and across the path of the load carrying reach of the first conveyor, a chute extending between said conveyors for conducting material from the first conveyor onto the second conveyor, a vertically disposed blade resting by gravity on said first conveyor adjacent said chute disposed to divert material from the first conveyor into said chute, frame means defining limits for free blade movement therebetween, and means included in said frame for transversely adjusting said blade across said first conveyor whereby a predetermined portion of the material on said first conveyor may be diverted into said chute.

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