Jan. 15, 1963 A. H. FREEMAN 3,073,077

ABRASIVE TUMBLING MACHINE

Filed Dec. 14, 1960 3 Sheets-Sheet 1

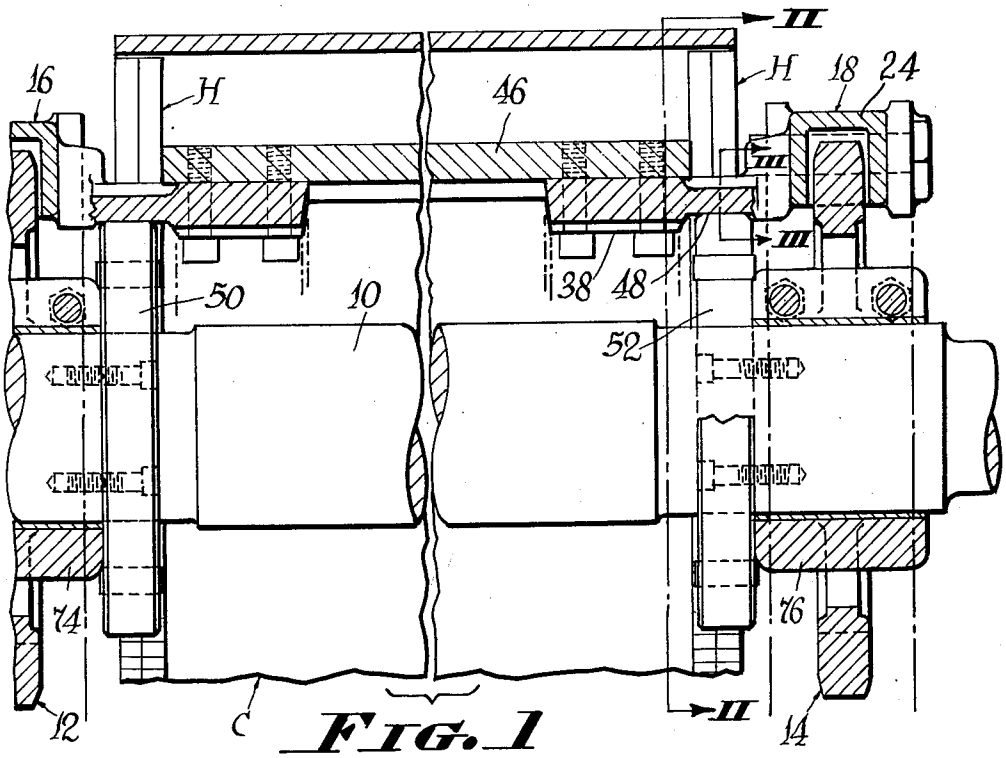

FIG. 1

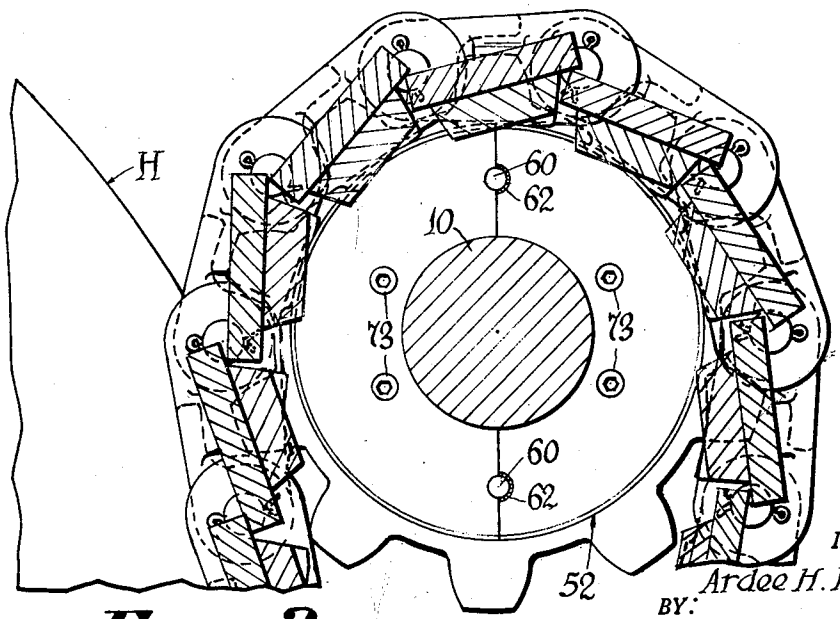

FIG. 2

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Filed Dec. 14, 1960 3 Sheets-Sheet 2

FIG. 3

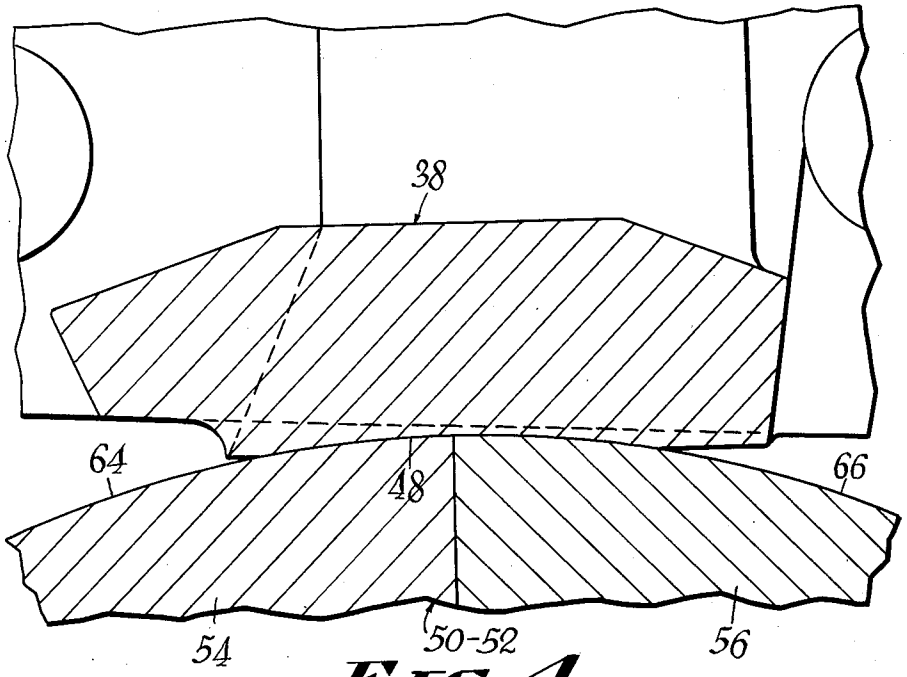
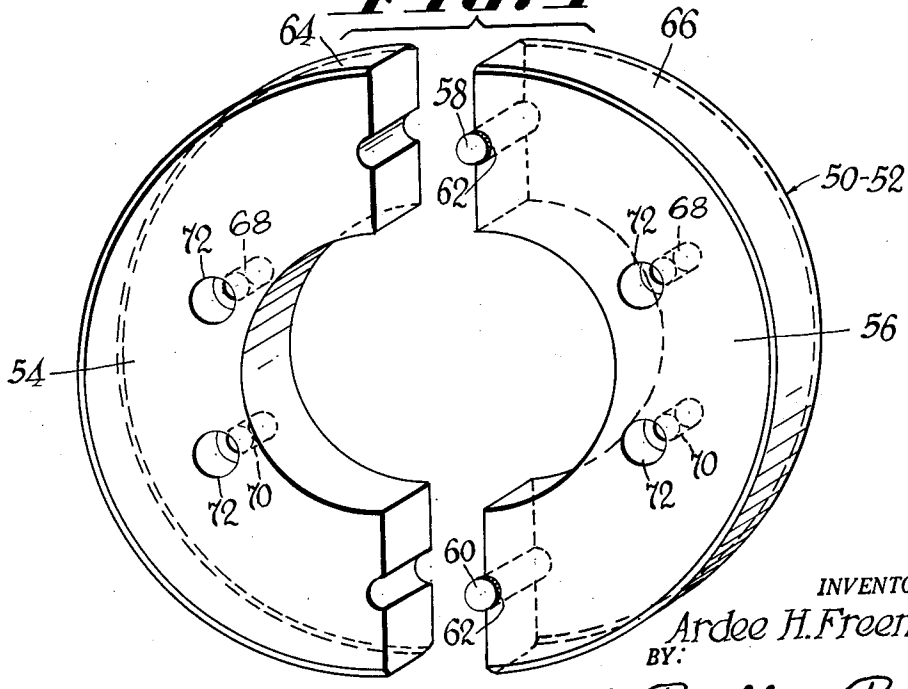


FIG. 4



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Filed Dec. 14, 1960 3 Sheets-Sheet 3

Fig. 6.

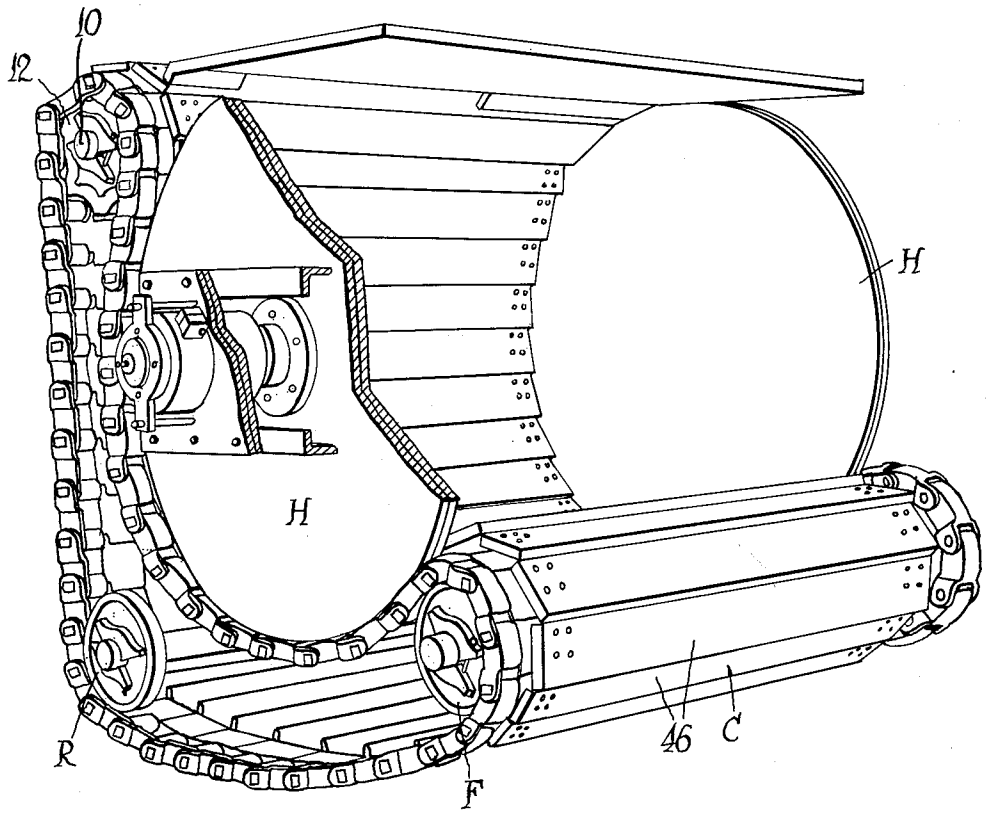
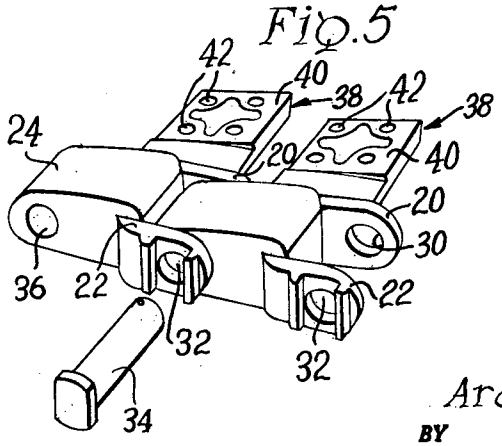


Fig. 5



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3,073,077

ABRASIVE TUMBLING MACHINE

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5 Claims. (Cl. 51—163)

This invention relates to abrasive cleaning and finishing machines and more particularly is directed to auxiliary support means for the conveying mechanisms used in such abrasive machines.

In abrasive machines of the type utilizing means for directing high velocity abrasive particles against a group of workpieces supported upon an endless flight conveyor mechanism which is so arranged as to effect a continuous agitation and tumbling of the workpieces, serious problems arise in effectively supporting the moving conveyor mechanism in such wise as to attenuate excessive wear conditions which may occur due to the abrasive-laden atmosphere within the machine. Thus, machines in which this type of action is utilized, and wherein the conveyor mechanism includes endless chains from which the driving force for the conveyor mechanism is attained, excessive wear may take place between the supporting and/or driving sprockets and the chain elements themselves. The present invention seeks to overcome excessive wear in this area of the conveyor mechanism by means of providing an auxiliary support for the chain elements and in such manner as does not interfere with the normal cooperative intermeshing relationship between the sprockets and the chains.

More particularly, an object of the present invention is to provide improved support devices for the chain links of a conveyor chain as specified above. Such support devices include auxiliary support rollers which are operable to sustain at least a substantial portion of the weight load normally taken up between the sprocket and chain and wherein the load support duty of the chain and sprocket is relieved by the cooperative engagement between the support devices and is distributed over a relatively large bearing area of the auxiliary support rollers.

A further object of this invention is to achieve a more efficient supporting action for conveyor mechanisms by providing weight-sustaining support therefor which is located a substantial distance inwardly from the opposite side edges of the conveyor to thereby effect a more nearly uniform supporting action.

More specifically, the above object relates to the utilization of support means located inboard of the driving sprockets, in particular, of such conveyor mechanism as use edge-extending endless chains as a means for driving and/or guiding the conveyor.

Still more specifically, this object of the invention relates to the incorporation of multiple purpose chain links in combination with auxiliary support rollers. The chain links operate not only as the sprocket-cooperable means for driving the conveyor, but also to present lateral extensions to which the conveyor flight pads are attached and, in addition, there is novel cooperation between such extensions and support roller means, whereby the sprockets are relieved substantially of all weight-induced loads and are required to impart substantially only conveyor driving loads, thus substantially attenuating and thereby minimizing excessive wear of both the chains and the sprockets. Then, by choosing suitable materials for the wear surfaces between the support roller means and the chain link extensions and heat treating the same, as required or necessary, wear factors may be more closely controlled than has heretofore been possible, reflecting a substantial increase in longevity of the conveyor mechanism.

Another object of this invention resides in the novel combination of relationship in an abrading machine of the character described in which the drive means of the conveyor mechanism is characterized by having drive sprockets subjected substantially only to driving loads, to the exclusion of weight-induced loads, the latter loads being taken up by auxiliary means operating in close association with the drive sprockets.

More specifically, the above object relates to the provision of a novel combinational relationship existing between the individual links of the conveyor chain and by means of which drive is imparted to the conveyor mechanism through associated drive sprockets, the individual links receiving support for the weight-induced loads through the medium of auxiliary means, whereby the chain links serve not only their usual purpose but also act in part as the means for relieving the sprocket and sprocket-contacting portions of the chains from weight-induced loads other than the conveyor driving loads.

FIG. 1 is a sectional view taken through a portion of an abrasive tumbling machine illustrating details of the conveyor flight mechanism thereof as associated with supporting sprockets therefor and illustrating also the improved link construction in accordance with the present invention as well as its cooperative relationship with the auxiliary support rollers according also to this invention;

FIG. 2 is a sectional view taken along the plane section line II—II of FIG. 1 and illustrating further details of the improved link members as well as their cooperative relationship and the plates of the conveyor flight;

FIG. 3 is an enlarged sectional view taken along the plane section line III—III in FIG. 1 and illustrating further details of the link construction as related to the auxiliary support roller mechanism;

FIG. 4 is a perspective view of one form of auxiliary support roller;

FIG. 5 is a perspective view of a pair of adjacent pivotally interconnected link members constructed in accordance with this invention and illustrating the same in cooperative relationship without the conveyor flight plates attached thereto; and

FIG. 6 is a perspective view of the interior details of an abrading machine with which the present invention is particularly useful and illustrates the environmental nature of the present device.

Referring now more particularly at this time to FIG. 1, a drive or idler shaft is indicated therein by the reference character 10, which shaft carries a pair of sprockets indicated generally by reference characters 12, 14, and which shaft is rotatably supported by any suitable conventional means not shown from the frame of the associated machine. The specific details of the shaft and sprockets is of no moment insofar as the present invention is concerned, since these devices are entirely of a conventional nature.

The conveying mechanism includes a pair of endless chain members indicated generally by reference characters 16, 18, each of which is of similar construction (one is "right" and one "left") and which is composed of a series of pin connected link elements cooperable with the respective teeth of the sprockets 12, 14, so as to mesh therewith in the well known conventional manner. Each link in accordance with the present invention, as can be seen more clearly in FIG. 5, is bifurcated at one end to present a pair of arms 20, 22 and also presents a nose 24 at its opposite end. The arms 20, 22, having opposed inner surfaces straddling and spaced closely from the opposite sides of the nose of the adjacent link member. The arms 20, 22 are provided with aligned openings 30, 32 adapted to receive a link pin 34 which serves to pivotally connect one end of each link to its next

adjacent link, whereas the nose 24 of each link is provided with a transverse bore 35 receiving a similar link pin 34 and whereby each link is pivotally connected at its opposite end to the next adjacent link. A lateral extension or pad indicated generally by the reference character 38 is joined integrally with the main body portion of each link and will be seen to include a flat upper surface 40 and a series of openings 42 to receive suitable fasteners 44 (see FIG. 1).

The surfaces 40 are canted as shown in FIG. 2 and serve as mounting platforms for the opposite ends of the conventional conveyor plate members 46 which bridge between and rigidly interconnect each corresponding pair of pads 38 of the two conveyor chains 16, 18.

FIG. 6 illustrates the environment in which the present invention may operate. As shown in this figure, the conveyor mechanism includes the upper, driven shaft 10 and its associated sprockets such as sprocket 12 and also includes the two lower idler shafts F and R. Rotatable barrel heads H serve to maintain the pouch or pocket configuration of the conveyor flight C and represent, with the conveyor flight, the workpiece-receiving region of the machine. The barrel heads are located inboard of the respective drive sprockets 12 and 14 and are in close adjacency to the opposite ends of the conveyor flight plates 46, all of which is conventional and forms no part of the present invention.

As shown in FIG. 3, it will be noted that each lateral extension 38 is also provided with an arcuate undersurface portion 48 which is adapted to rest upon and bear against the outer periphery of one of the corresponding auxiliary support rollers 50 or 52. In a preferred embodiment of the invention, each support roller 50 or 52 is constructed in accordance with the illustration in FIG. 4 of the drawing. In this figure, it will be noted that each of the auxiliary support rollers is formed from two substantially identical half sections 54 and 56. This particular type of auxiliary support roller is first fully machined and afterwards cut in half along the parting line shown after having been provided with a pair of diametrically opposed bores located along the proposed parting line. These bores are adapted to receive locating pins 58 and 60 which serve to properly align the halves when reassembled. For convenience, the locating pins may be inserted into one of the halves and secured thereto as by welding 62 or the like so that when the halves are brought together their outer surfaces 64 and 66 will be in perfect alignment to present a smooth and uninterrupted circular support surface. The halves 54, 56 are subjected to suitable heat treating operations to effect a desired degree of hardness of their outer surfaces 64, 66, minimizing wear thereof. The manner in which the auxiliary roller members provide radial support for the individual links of the chains 16, 18 is illustrated best in FIG. 3 where it will be seen that the arcuate undersurfaces 48 of the link extensions 38 bear directly upon the surfaces 64, 66 and present relatively large surface areas to reduce the unit bearing pressures between these members.

Each of the roller halves 54 and 56 is provided with a pair of axially extending openings 68 and 70 preferably countersunk as indicated by reference character 72 to receive cap screws 73 or the like which extend therethrough and are received in tapped openings in the hubs 74 and 76 of the respective sprockets 12 and 14. The inner diameter of the auxiliary support rollers are such as to closely embrace the associated shaft 10 substantially as is shown in FIG. 2. It will also be noted that the arcuate surfaces 48 of the extensions 38 have their center of curvature coincidental with the axis of the shaft 10 so that full bearing pressure is evenly distributed by the peripheral surfaces of the support rollers and the arcuate undersurfaces 48 of the link extensions 38. It is to be noted that the outer diameter of the support rollers is such that whereas the cooperable link extensions and support rollers take up or support substantially all of the weight-induced loading imposed between the conveyor flight assembly and the shaft 10, thus reducing the bearing loads between the sprockets 12 and 14 and the chains 16 and 18, the outer diameter of the support rollers is not such as would interfere with the normal engagement between the conveyor chains and the sprocket.

It will also be noted that the loads imposed on the conveyor flight plates 46 are more efficiently carried by the support rollers 50 and 52 by virtue of the fact that these rollers are positioned closer to the opposite ends of the individual plates 46 than is possible with the chains 16 and 18 alone. That is to say, since the conveyor chains 16 and 18 and their sprockets 12 and 14 must be beyond the barrelheads H, this imposes a limitation on the closeness of spacing between the chains 16 and 18 and the ends of the conveyor plates 46. Thus, the present construction more effectively and efficiently supports the loads imposed upon the conveyor mechanism.

Further the loads on the sprockets 12 and 14 are reduced to the point where their purpose is primarily that of driving the conveyor as contrasted with supporting and driving loads as is the case with systems not utilizing the link extensions and auxiliary support rollers according to the present invention.

Still further, it will be readily appreciated that by making the arcuate surface 48 relatively wide and long and making the support rollers 50 and 52 correspondingly wide, the unit bearing loads between the link extensions and the auxiliary support rollers is maintained relatively low so as to minimize wear.

I claim:

1. In an abrasive tumbling machine of the type having a pair of endless chain members rigidly supporting therebetween a plurality of conveyor plates for supporting workpieces, wherein the system includes a rotatable shaft and a pair of drive members thereon engaged with the endless chains, the improvement consisting of auxiliary support means to relieve the endless chains of radial bearing loads imposed against said drive members, said auxiliary support means including a pair of auxiliary support rollers, one associated with each of said drive members and lateral extensions on each of the links of said endless chains having undersurface portions engageable with respective ones of said auxiliary support rollers as said chains pass over said drive members for relieving the radial bearing loads between the chains and drive members.

2. In an abrasive tumbling machine, a drive shaft carrying a pair of drive members, a pair of endless chain members trained over respective drive members, each chain comprising a series of pivotally interconnected links, each link having a lateral extension thereon and there being a plurality of conveyor flight plates extending between and rigidly affixed to corresponding link extensions of the two chains, the improvement consisting of auxiliary support means interposed between said shaft and said link extensions and engageable with said extensions as said chains pass over said drive members to relieve the drive members of substantially all loads imposed thereon excepting the load incident to driving the chains through the drive members.

3. In a conveyor mechanism, a pair of parallel endless chains, a drive shaft having a pair of sprockets fixed thereto engaged with said chains, each chain having pivotally interconnected links provided with laterally extending pad portions in which the pad portions of the two chains project toward each other, a conveyor flight plate extending between each transversely aligned pair of pad portions of the two chains and being rigidly affixed thereto whereby each plate and its associated links form a rigid unit, radial load-relieving mechanisms for each sprocket comprising roller means supported on said shaft and located inboard of its respective sprocket, and each pad portion having an under surface portion engageable with its associated roller

means whereby each of said rigid units is radially supported from said shaft through said roller means when the respective chain links thereof are engaged with said sprockets.

4. In an abrasive tumbling machine of the type having a pair of endless chain members rigidly supporting therebetween a plurality of conveyor plates for supporting workpieces, wherein the system includes a rotatable shaft and a pair of sprockets thereon engaged with the endless chains, the improvement consisting of auxiliary support means to relieve the endless chains of radial bearing loads imposed against said sprockets, said auxiliary support means including a pair of auxiliary support rollers, one associated with each of said sprockets and lateral extensions on each of the links of said endless chains having undersurface portions engageable with the respective said auxiliary support rollers for relieving radial bearing loads between the chains and sprockets, each of said support rollers having separable, complemental half-sections, said sections presenting an internal diameter closely embracing said shaft and each having means securing the same to a respective one of said sprockets.

5. In an abrasive tumbling machine having a conveyor mechanism including an upper drive shaft, a pair of horizontally spaced idler shafts, and a conveyor flight trained on said shafts and presenting a work-receiving pocket between said drive shaft and one of said idler shafts, said conveyor flight including a pair of endless chains along its opposite edges, drive imparting means carried by said drive shaft and engaged with said conveyor flight for moving the latter, said drive imparting means being in the form of a sprocket engaged with each chain, auxiliary support means carried by said drive shaft and engageable with said conveyor flight as the same passes over the drive shaft to relieve said drive imparting means of substantially all loads excepting the drive load, said auxiliary support means being in the form of a support roller located inboard of each sprocket, the links of said chains having lateral pads resting upon respective ones of said rollers as the chains pass over said sprockets.

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