Oct. 3, 1967 E. L. VON HOFEN 3,344,905

CHAIN

Filed Oct. 17, 1966 3 Sheets-Sheet 1

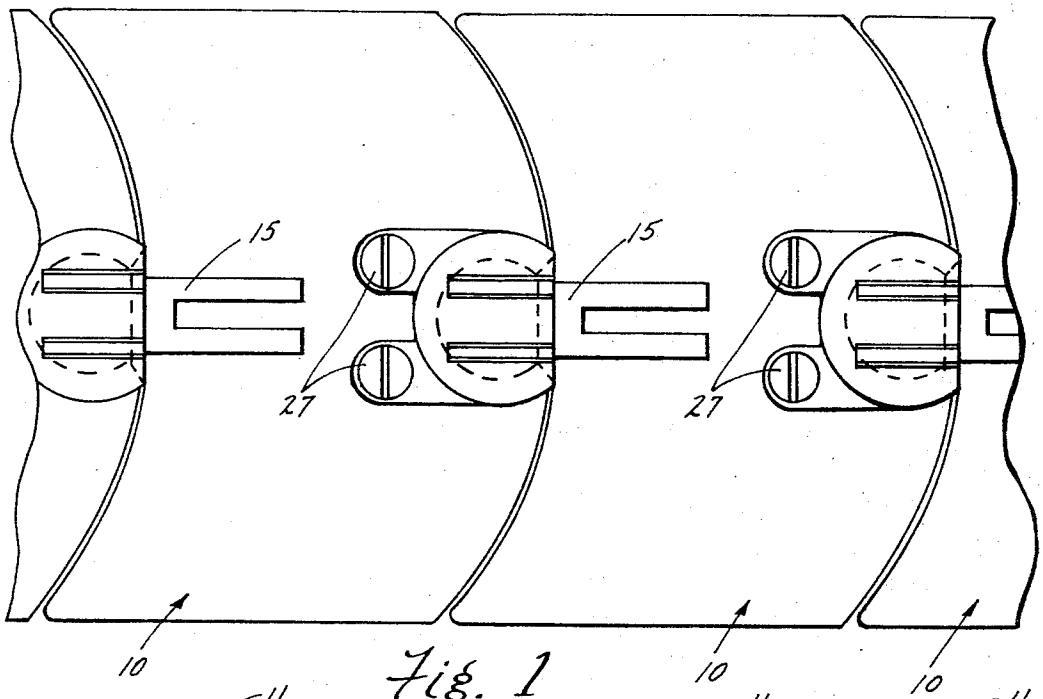


Fig. 1

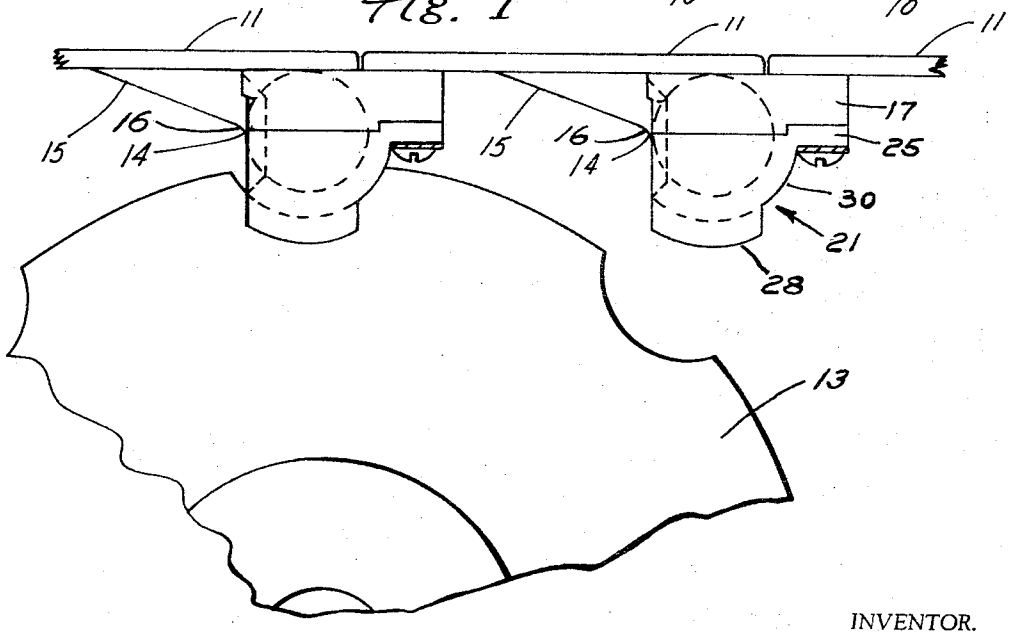


Fig. 2

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CHAIN

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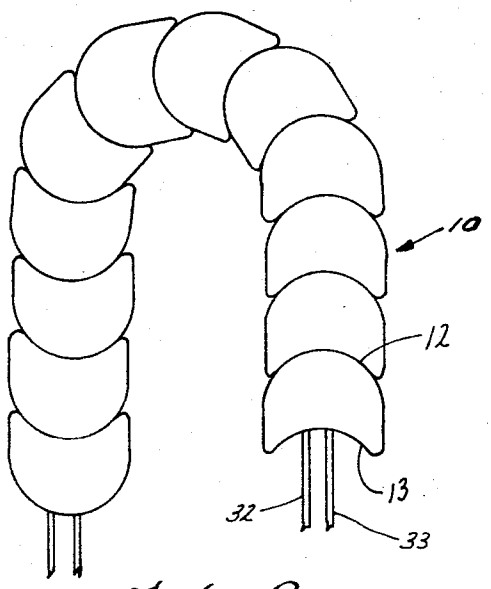


Fig. 3

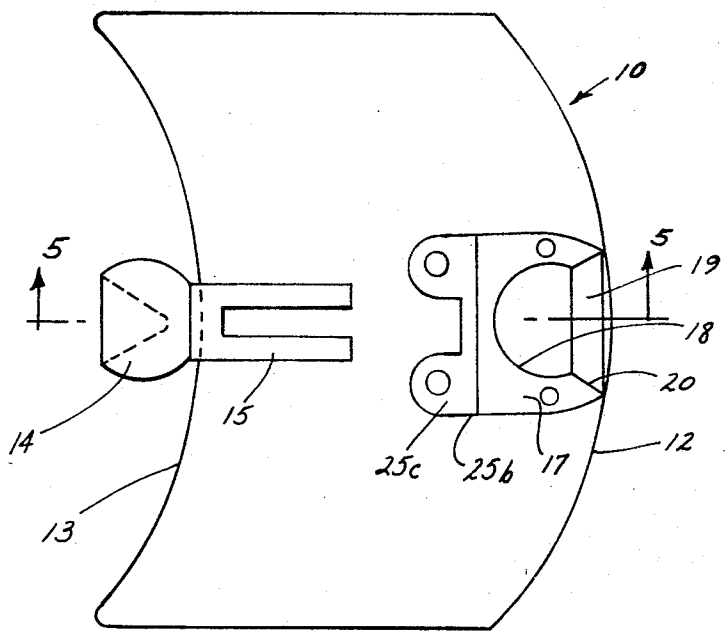


Fig. 4

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CHAIN

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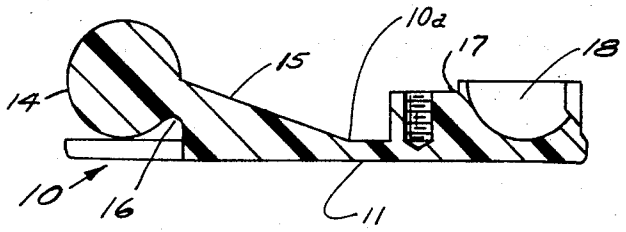


Fig. 5

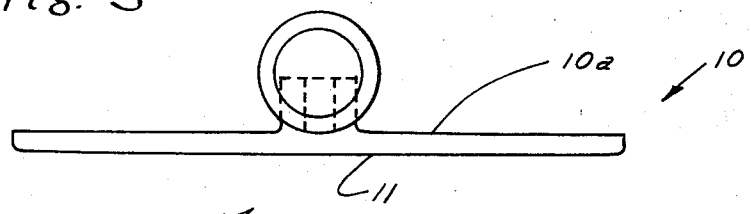


Fig. 6

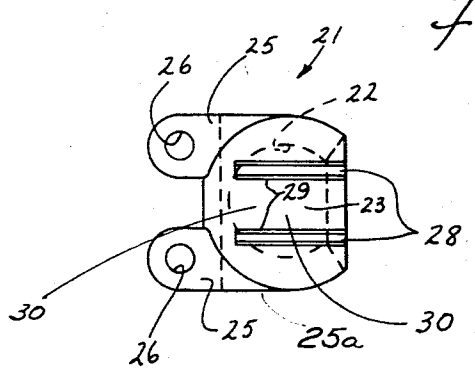


Fig. 7

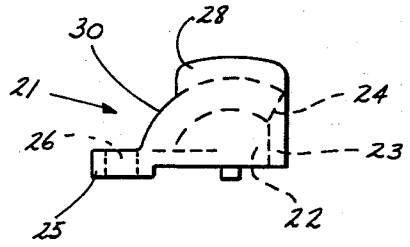


Fig. 8

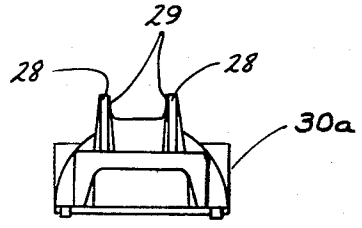


Fig. 9

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CHAIN

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10 Claims. (Cl. 198—189)

ABSTRACT OF THE DISCLOSURE

A ball-and-socket type conveyor chain, the links of which have upper table portions which support articles to be conveyed and which include a ball portion and a socket portion connected to the table portion. The ball portion of one link is retained in the socket portion of an adjacent link by a cap having outer surfaces that are drivingly engageable by a sprocket and also having other guide surfaces for centering the cap relative to the sprocket.

This invention relates in general to chains and, more particularly, to chains of the conveyor type.

An object of the invention is to provide an improved chain structure having a load supporting surface that is substantially uninterrupted throughout the load carrying extent of the chain irrespective of the fact that flexure of the chain may occur as it is trained around propelling or guiding sprocket wheels which may be disposed in a number of different planes.

Another object of the invention is to provide an improved chain of simplified but rugged construction which requires the use of but a few parts of simplified structure that is easy and inexpensive to manufacture and which may be easily assembled or disassembled or cleaned by relatively unskilled persons and without requiring the use of special tools.

Still another object of the invention is to provide an improved chain wherein individual elements thereof simultaneously perform dual functions and wherein frictional effects are minimized.

Other objects and advantages will become apparent from the following description taken in connection with the accompanying drawings in which:

FIGURE 1 is a partially broken away bottom plan view illustrating adjacent links of a chain embodying the invention;

FIGURE 2 is a partially broken away side elevation of the chain of FIGURE 1;

FIGURE 3 is a partially broken away top plan view of the chain of FIGURE 1;

FIGURE 4 is a bottom plan view of a link of the chain of FIGURE 1;

FIGURE 5 is a sectional view taken along line 5—5 of FIGURE 4;

FIGURE 6 is an end elevation of the link as viewed from left to right in FIGURE 4;

FIGURE 7 is a plan view of the cap member of the chain of FIGURE 1;

FIGURE 8 is a side elevation of the cap member; and,

FIGURE 9 is an end elevation of the cap member.

As shown in the drawings, a chain embodying the present invention comprises a plurality of individual links **10** each having an upper or load supporting surface **11** that extends laterally outward in opposite directions from the longitudinal axis of the chain. The ends of surface **11** terminate in rounded portions **12** and cut-away portions **13**, respectively. Depending from and adjacent one end of the lower surface of link **10** is a ball member **14** and a bracket **15** with a neck portion **16** therebetween. Thus, the outer wall surface of ball member **14** is a spherical surface, the center of which is contained in a plane that is

perpendicular to surface **11** and also passes through the axis of the chain and, hence, link **10**. The spherical outer surface of ball member **14** is partially interrupted by the neck portion **16** between ball member **14** and bracket **15**.

Depending from and adjacent the opposite end of the lower surface of link **10** is a ball-seat or socket portion **17** having wall portions thereof shaped to define a semi-spherical ball-receiving recess or cavity **18**. At its end that is directly opposite ball member **14**, socket portion **17** is provided with an opening **19** having chamfered or beveled edges **20** for a purpose that will become apparent as the description proceeds.

A ball-retaining or cap member **21** having inner wall portions thereof shaped to define an internal semi-spherical ball-receiving recess **22** of substantially the same dimensions as cavity **18** is also provided with an opening **23** having chamfered or beveled edges **24** of dimensions to correspond with those of opening **19** and edges **20**. Member **21** is also provided with a pair of spaced apart lugs or brackets **25**, each having an opening **26** for receiving a screw **27** for the purpose of detachably connecting member **21** to socket portion **17**.

Integrally formed with and upstanding from the outer surface of cap member **21** are a pair of parallel spaced apart guides **28**, the edges of which may be chamfered if desired as at **29**. In accordance with the invention, cap member **21**, in addition to its ball-retaining function, is also arranged to receive propelling and/or guiding forces. Accordingly, that portion of the outer surface of cap member **21** that extends between lugs or brackets **25** and also between guides **28** is shaped to form a segmental cylindrical surface **30**, **30***a* which is adapted to be engaged either in driven or in guided relationship by either a propelling or guiding sprocket wheel **31**. Similarly, guiding forces may be received by side edges **25***a* of lugs **25** and/or by side edges **25***b* of corresponding lug portions **25***c* of socket portion **17** or by the under surface **10***a* of link **10** from guide rails **32**, **33**. Thus, a chain embodying the present invention is capable of making turns in planes angularly disposed relative to the plane containing the web portions of propelling or guiding sprocket wheels **31** and is capable of operating over flight portions that are angularly disposed relative to one another.

As illustrated, link **10** is integrally formed with ball portion **14** and bracket portion **15** and socket portion **17** is similarly formed as by casting or molding, but it will be apparent to those skilled in the art that the invention is not necessarily limited to such construction. For example, ball portion **14** and bracket **15** may be connected together by means of threaded fastening means and bracket **15** as well as socket portion **17** may be connected to support surface **11** by threaded fastening means similar to that employed to connect cap member **21** to socket portion **17**, if desired, without departing from the invention.

While the invention is not necessarily limited to the use of any particular materials, the use of certain materials in the construction of chains embodying the invention presents certain advantages. For example, in connection with certain intended uses of chain in accordance with the invention it may be desirable to make the support surface **11** and ball member **14** of steel or perhaps of stainless steel, in which case the socket portion **17** and cap member **21** preferably will be made of a plastic material of a known type and which has a very low coefficient of friction, such as nylon, Teflon, Delrin, etc. In connection with other intended uses, or for reasons of manufacturing economies, all elements of a chain in accordance with the invention may be made of such plastic materials with the exception of screws **27** or similar fastening means.

The chain is assembled by placing the ball portion **14** of a link **10** into the cavity **18** of socket portion **17** of an adjacent link and securing said ball portion within said

socket portion by placing a cap portion **21** over said ball portion and securing the cap portion to the socket portion by insertion and tightening of screws **27**. Such assembly procedure is continued until a sufficient number of links **10** are thus connected together to form a chain of desired length. In the event that it may be desirable to replace an individual link **10**, cap member **21** that is connected to said link is removed by removing its screws **27**. The cap member that secures the ball portion **14** of the link to be replaced is also removed by removing its screws. The replacement link is then assembled into the chain by following the above-noted assembly procedure. Thus, it will be aparent that a chain embodying the present invention can be completely assembled or disassembled without special tools since an ordinary screwdriver will suffice for either of such operations and further that such operations can be performed by unskilled rather than skilled workmen.

While particular embodiments of the invention have been illustrated and described, it will be apparent to those skilled in the art that various changes and modifications may be made without departing from the invention and it is intended in the appended claims to cover all such changes and modifications that fall within the true spirit and scope of the invention.

What is claimed is:

1. In a conveyor chain,

a link having a surface for supporting an article to be conveyed, said link having a ball portion spaced from said surface and having

a socket portion having walls defining a ball-receiving cavity space from said ball portion, and

means including a ball-retaining member adapted to be connected to said socket portion, said member having

a force-receiving outer surface adapted to be engaged by an impelling force-producing means.

2. Structure according to claim **1** wherein said link includes a table portion having an article-supporting surface and said ball portion and said socket portion are connected to said table portion.

3. Structure according to claim **2** wherein said table portion is integrally formed with said ball portion and said socket portion.

4. Structure according to claim **1** wherein said ball-retaining member has a segmental cylindrical surface portion adapted to be engaged by sprocket means.

5. Structure according to claim **4** wherein said member includes guide means disposed adjacent said cylindrical surface portion.

6. A link portion for a conveyor chain having

a table portion having an article-supporting surface,

a ball portion connected to said table portion,

a socket portion connected to said table portion and having walls defining a ball-receiving cavity spaced from said ball portion, and having

means including securing means for removably retaining for limited pivotal movement within said cavity a ball portion of another link portion.

7. Structure according to claim **6** wherein said table portion is integrally formed with said ball portion and said socket portion.

8. For use with a link portion of a conveyor chain, a cap portion having inner walls defining a ball-retaining cavity portion and having other walls defining a planar surface portion and an outer force-receiving surface adapted to be engaged in driving relationship by an impelling force producing means, and securing means including a bore extending through said other walls for removably connecting said planar surface portion to a said link portion.

9. Structure according to claim **8** wherein said force-receiving surface is a segmental cylindrical surface.

10. Structure according to claim **9** and additionally including a guide means comprising a second planar surface parallel to a plane normal to said cylindrical surface, which plane includes the center of said cavity.

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