(54) Titre : CONVOYEUR A CHAINES A RACLETTES POURVU DE POUSSOIRS EN MATIERE PLASTIQUE

(54) Title: SCRAPER CHAIN CONVEYOR COMPRISING PLASTIC PUSHERS

(57) Abrégé/Abstract:
The invention relates to a scraper chain conveyor for use in underground mining, especially in hard coal mining, said conveyor consisting of interconnected, profiled conveyor channels, metallic conveyor chains which are guided in said channels, plastic pushers which are fixed to the chains, and at least one drive for driving the conveyor chains. Said scraper chain conveyor is characterised in that the connection between the plastic pushers (10) and the conveyor chain (11, 12) is embodied by cladding corresponding, annular chain members (13) of the conveyor chain (11, 12). The plastic which is cast for the simultaneous production of the plastic pushers (10) embodied as a single component with the connecting regions holding the chain members (13) penetrates the chain members (13) of the conveyor chain (11, 12) and surrounds the same.
Title: SCRAPER CHAIN CONVEYOR COMPRISING PLASTIC PUSHERS

Bezeichnung: KETTENKRATZERFÖRDERER MIT KUNSTSTOFF-MITNEHMERN

Abstract: The invention relates to a scraper chain conveyor for use in underground mining, especially in hard coal mining, said conveyor consisting of interconnected, profiled conveyor channels, metallic conveyor chains which are guided in said channels, plastic pushers which are fixed to the chains, and at least one drive for driving the conveyor chains. Said scraper chain conveyor is characterised in that the connection between the plastic pushers (10) and the conveyor chain (11, 12) is embodied by cladding corresponding, annular chain members (13) of the conveyor chain (11, 12). The plastic which is cast for the simultaneous production of the plastic pushers (10) embodied as a single component with the connecting regions holding the chain members (13) penetrates the chain members (13) of the conveyor chain (11, 12) and surrounds the same.

Zusammenfassung: Ein Kettenkratzerverförderer für den untertägigen Bergbaueinsatz, insbesondere im Steinkohlenbergbau, bestehend aus miteinander verbunden, profilierten Fördererrippen und darin geführten, aus einem metallischen Werkstoff bestehenden Fördererketten mit an den Ketten angeschlagenen, aus Kunststoff bestehenden Mitnehmern sowie mit wenigstens einem Antrieb für die Fördererketten, ist dadurch gekennzeichnet, dass die Verbindung der Kunststoffmitnehmer (10) mit der Fördererkette (11, 12) durch Umglassen entsprechender, ringförmiger Kettenländer (13) der Fördererkette (11, 12) ausgebildet ist, wobei der zur gleichzeitigen Herstellung der einstöckig mit den die Kettenländer (13) erfassenden Verbindungsbereichen ausgebildeten Kunststoffmitnehmer (10) vergossene Kunststoff die Kettenländer (13) der Fördererkette (11, 12) durchdringt und umschliesst.
Drag Chain Conveyor Having Plastic Carriers

Description

The invention relates to a drag chain conveyor for use in underground mining, especially in hard or bituminous coal mining, comprising interconnected, profiled conveyor chutes and conveyor chains, of metallic material, guided therein, with plastic carriers attached to the chains, as well as with at least one drive for the conveyor chains.

A drag chain conveyor having the aforementioned features is described in WO 01/81211 A1. Pursuant to one embodiment thereof, at least the carriers are comprised at least partially of a self-distinguishing, difficult to ignite plastic having a high mechanical strength, without any details being provided as to how the conveyor chains, with the carriers connected thereto, should be embodied. It is therefore an object of the present invention to provide, for a drag chain conveyor having the aforementioned general features, a suitable connection of the plastic carriers with the metallic conveyor chains.
The realization of this object, including advantageous embodiments and further developments of the invention, is derived from the contents of the patent claims that follow this description.

The basic concept of the invention is that the connection of the plastic carriers with the conveyor chain is effected via a molding around of corresponding, annular chain links of the conveyor chain, whereby the plastic, which is molded for the simultaneous production of the plastic carriers monolithically with the connecting regions that hold the chain links, penetrates and surrounds the chain links of the conveyor chain. This has the advantage that the plastic carriers and their connection with the chain links is produced in a single operation. The molding around of the chain links has the advantage that in the critical cross-sectional region, namely at the connection location between chain link and carrier, a massive increase of the cross-sectional region occurs, whereby the carrier geometry, in individual cases, is to be designed such that the critical weak point areas receive a maximum cross-sectional area.

Pursuant to one embodiment of the invention, the conveyor chain can be composed of individual, interconnected chain strands having plastic carriers molded thereon. Since the connection between the plastic carriers
carriers and the individual chain links is to occur by molding of a plastic matrix, in particular not underground on location, care is taken that chain strands, with plastic carriers molded thereon, are designed in optimum lengths. The length depends, in individual cases, upon the application and also upon the transport possibilities. For example, chain strands of varying length are provided as standard strands, adaptor strands, repair strands, etc.

The design of the plastic carriers and their connection is a function, in individual cases, of the design of the conveyor chains having carriers as a chain unit; for example, it can be provided pursuant to specific embodiments of the invention that the carriers be disposed between two outwardly disposed individual chains, alternatively on a centrally extending chain, or in a further alternative on two spaced apart, centrally extending chains, whereby in the last case a so-called double central chain is formed.

Pursuant to one embodiment of the invention, for the manufacture of the plastic carriers, including their connection regions with the chain links, a plastic material that is able to flow, and that has self-extinguishing, difficult to ignite, and anti-static material properties, is used. For example, a polyamide casting plastic can be used for
producing the plastic carriers. Furthermore, from thermoplastics, a polyamide PEI/PAI or a polyether ketone PEEK can be used. A conceivable matrix from duroplastics can be an epoxy matrix, a polyester matrix, or a phenol matrix.

Pursuant to an embodiment of the invention, metallic reinforcing particles are cast into the plastic carriers.

However, in particular it can be provided that for reinforcement of the plastic carriers, reinforcing fibers are introduced into the plastic material.

In this connection, pursuant to a first alternative, short reinforcing fibers having a random distribution are embedded into the plastic matrix. Alternatively, reinforcing fibers that extend over the length of the plastic carriers can be introduced into the plastic matrix, whereby the reinforcing fibers can alternatively be disposed so as to extend about the chain links, or so as to be passed through the chain links.

For the reinforcement of the plastic matrix, mesh, fabric, braiding or knitting of reinforcing fibers can be introduced. Carbon fibers, aramid fibers, or even glass fibers can, for example, be used.
Embodiments of the invention are shown in the drawing, whereby the illustrations are respectively limited to the showing of an individual plastic carrier with its connection to the chain links of a so-called double central chain having two parallel and spaced-apart central chains. The drawing shows:

Fig. 1 a carrier with chain connection and short reinforcing fibers introduced in a random distribution.

Fig. 2 a plastic carrier pursuant to Figure 1 having reinforcing fibers extending over the length of the plastic carrier.

Fig. 3 another embodiment of the plastic carrier pursuant to Figure 2.

Fig. 4 a further embodiment of the plastic carrier of Figure 2.

Fig. 5 the plastic carrier having a mesh of reinforcing fibers introduced.

The construction of a drag chain conveyor having the aforementioned features can be derived in detail from WO 01/81211 A1, which is mentioned as the closest state of the art, so that reference is made thereto. As can be seen from Figure 1, the connection of a plastic carrier 10 with the annular chain links 13 of the two central chains 11
and 12 is formed in that during the casting or molding around of the  
chained links 13, the plastic or synthetic material matrix penetrates and  
surrounds the chain links 13 of the two central chains 11 and 12. For  
the reinforcement of the plastic matrix, reinforcing fibers 14 having a  
short length are randomly distributed in the plastic carrier.

In the embodiment illustrated in Figure 2, introduced into the plastic  
matrix of the plastic carrier 10 are reinforcing fibers 15 having such a  
length that the reinforcing fibers 15 extend over the length of the plastic  
carriers 10. In so doing, the reinforcing fibers 15 surround the chain  
links 13 of the two central chains 11 and 12, which chain links are  
embedded in the plastic matrix.

In the embodiment illustrated in Figure 3, the reinforcing fibers 15 are  
passed between the chain links 13 of the two central chains 11 and 12  
in such a way that the reinforcing fibers 15 cross in the region between  
the two central chains 11 and 12.

Figure 4 shows a further alternative arrangement of the course of the  
reinforcing fibers 15, according to which the reinforcing fibers also  
extend through the openings of the annular chain links 13 and thus at  

least partially also interconnect the chain links 13 of the two central chains 11 and 12.

Finally, in the embodiment illustrated in Figure 5, a mesh 16 of reinforcing fibers is provided that can also be embodied as fabric, braiding or knitting.

The features of the subject matter disclosed in the preceding description, the patent claims, the abstract and the drawing can be important individually as well as in any desired combination with one another for realizing the various embodiments of the invention.
Patent Claims

1. Drag chain conveyor for use in underground mining, especially in hard or bituminous coal mining, comprising interconnected, profiled conveyor chutes and conveyor chains, of metallic material, guided therein, with plastic carriers attached to the chains, as well as with at least one drive for the conveyor chains, characterized in that the connection of the plastic carriers (10) with the conveyor chains (11, 12) is effected via a molding around of corresponding, annular chain links (13) of the conveyor chains (11, 12), whereby the plastic, which is molded for the simultaneous production of the plastic carriers (10) monolithically with the connecting regions that hold the chain links (13), penetrates and surrounds the chain links (13) of the conveyor chains (11, 12).

2. Drag chain conveyor according to claim 1, characterized in that the conveyor chains (11, 12) can be composed of individual, interconnected chain strands having plastic carriers (10) cast thereon.
3. Drag chain conveyor according to claim 1 or 2, characterized in that the plastic carriers (10) are disposed between two outwardly disposed individual chains.

4. Drag chain conveyor according to claim 1 or 2, characterized in that the plastic carriers (10) are disposed on a centrally extending central chain.

5. Drag chain conveyor according to claim 1 or 2, characterized in that the plastic carriers (10) are disposed on two spaced-apart central chains (11,12) that extend centrally through the plastic carriers (10).

6. Drag chain conveyor according to one of the claims 1 to 5, characterized in that for the production of the plastic carriers (10), including their connecting regions with the chain links (13), a flowable plastic material having self-extinguishing, difficult to ignite, and anti-static material properties is used.

7. Drag chain conveyor according to one of the claims 1 to 6, characterized in that for the reinforcement, metallic reinforcing particles are cast into the plastic carriers (10).
8. Drag chain conveyor according to one of the claims 1 to 6, characterized in that for the reinforcement of the plastic carriers (10), reinforcing fibers (14,15) are introduced into the plastic material.

9. Drag chain conveyor according to claim 8, characterized in that short reinforcing fibers (14) having a random distribution are embedded into the plastic matrix of the plastic carriers (10).

10. Drag chain conveyor according to claim 8, characterized in that reinforcing fibers (15) that extend over the length of the plastic carriers (10) are introduced into the plastic matrix.

11. Drag chain conveyor according to claim 10, characterized in that the reinforcing fibers (15) are disposed so as to extend about the chain links (13).

12. Drag chain conveyor according to claim 10, characterized in that the reinforcing fibers (15) are disposed so as to be passed through the annular chain links (13).
13. Drag chain conveyor according to claim 8, characterized in that a mesh (16) of reinforcing fibers is disposed on or in the plastic matrix.

14. Drag chain conveyor according to claim 8, characterized in that a fabric of reinforcing fibers is introduced into the plastic matrix.

15. Drag chain conveyor according to claim 8, characterized in that a braiding of reinforcing fibers is introduced into the plastic matrix.

16. Drag chain conveyor according to claim 8, characterized in that a knitting of reinforcing fibers is introduced into the plastic matrix.