GUARD FOR CHAINS DISPOSED ALONG A MINING CONVEYOR

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Fig. 1

Fig. 2

ALOIS HAUSCHOPP

INVENTOR

BY
Burgess, Dunklage & Sprung
ATTORNEYS
GUARD FOR CHAINS DISPOSED ALONG A MINING CONVEYOR

Alois Hauchopp, Werne an der Lippe, Germany, assignor to Gewerkschaft Eisenhütte Westfalia, Witten, near Lenin, Westphalia, Germany, a corporation of Germany

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The present invention relates to a guard for covering a chain disposed laterally along the side of a mining conveyor, and more particularly to an improvement in a mining arrangement including a mining conveyor having a drive chain disposed along one side thereof with a drive chain guard housing enclosing such drive chain, the improvement contemplating means for attaining ready access to the drive chain normally covered by the guard housing.

Mining conveyors are known which normally comprise mining conveyor sections articulatedly interconnected longitudinally in end to end relation with means for advancing the conveyor progressively toward the mine face as the mining planer usually disposed for movement along the mine side of the conveyor is displaced back and forth along the mine face in extractive engagement with the mine face for the winning of mineral such as coal therefrom. The mineral is conducted during the operation onto the conveyor for removal from the site of mining operations. In order to conduct the mining planer longitudinally back and forth along the mine face, a drive chain is utilized either at the side of the conveyor adjacent the mine face or at the side thereof remote from such mine face, i.e., the working side, where access may be had by the workmen to the equipment being utilized. The drive chain is normally mounted at the ends of the conveyor in the form of an endless drive chain or cable, or the like, over appropriate sprocket wheels energized to drive the chain alternately in both directions to achieve the movement of the mining planer back and forth along the mine face.

U.S. Patent 2,745,651 concerns a mining planer of the type having a keel extending under the conveyor for stabilizing the position of the planer during mining operations with the drive chain being located on the mine face side of the conveyor. Means are shown which are attached to the side of the conveyor remote from the mine face for advancing the conveyor progressively toward the mine face as mineral, such as coal, is progressively extracted.

U.S. Patent 2,691,514 shows another arrangement of a mining conveyor and mining planer of the type having a keel underlying the conveyor as well as means for advancing the conveyor toward the mine face. In particular, sprocket wheels are shown over which the drive chain for the planer is mounted to achieve the back and forth movement of the planer. The drive chain in this instance is also disposed along the mine face side of the conveyor.

U.S. Patent 2,781,888 shows another form of mining conveyor and mining planer of the type having a keel underlying the conveyor, and illustrates a particular embodiment for achieving articulated interconnection for individual conveyor sections whereby the conveyor may be advanced more or less section by section toward the mine face as the planer executes the back and forth movement in extractive engagement with such mine face.

In U.S. Patent 2,823,908, a similar mining conveyor is shown including a mining conveyor in articulatedly interconnected sections and a mining planer having a keel underlying the conveyor. On the other hand, the drive chain for the planer in this instance is disposed at the side of the conveyor remote from the mine face such that the planer is attached to such drive chain by a connecting means situated at the end portion of the keel extending beyond the remote side of the conveyor. A housing is provided partially enclosing the planer-keel-connecting means as well as the drive chain whereby to protect the workmen in the event of rupture of the chain under the extreme tension to which the chain is subjected for driving the planer along its path in extractive engagement with the mine face.

Indeed, it is possible to provide the drive chain on either side of the conveyor for suitable attachment with the mining planer and an alternate expedient is to provide a drive chain having one strand on the mine face side of the conveyor and the other strand on the remote side of the conveyor with suitable sprocket wheel mounting of the chain at the ends of the conveyor so as to achieve the desired movement of the planer. It will be appreciated, however, that because of the excessive tension under which the chain is operated, the latter arrangement is not usually preferred since it will cause unnecessary friction at the points of articulated connection between the mining conveyor sections, and of course less free working space for the workmen is present where the drive chain is disposed with strands on both sides of the conveyor.

In order to protect personnel working in the mine drift or mine shaft, and also to protect the equipment installed therein, measures are normally taken to prevent any such drive chains, which run along the conveyor and especially on the working side thereof, i.e., the side remote from the mine face, from causing heavy damage in the event there should be any break in the chain, considering the great tension such chains are under during the mining operations. The art is replete with means for achieving this desired protection. Generally, the drive chains, which run, for instance, along the working face side of the conveyor, are covered by guards which leave open only a small gap at the junctions of the successive lengths of the guard appropriately attached to the corresponding individual conveyor sections, whereby to permit observation of the chain during the mining operation. When a break in the chain occurs, perhaps due to overloading caused by the mining planer encountering excessive forces in the mine face, it is necessary to find the location of the break whereupon the entire length of the particular guard must be removed at the appropriate point and the chain must then be mended. As a practical matter, this means that all of the gear required for the removal of the particular guard where the break occurs must be brought into the mine drift or mine shaft to the appropriate place in order to achieve the removal of the guard. This is undertaken mechanically since tools are necessary to detach the particular guard from the mining conveyor section. After mending the chain, the guard must again be installed and the tools must be used for this purpose as well. Understandably, the manipulations required for the removal and reinstallation of a particular guard inevitably cause a relatively long interruption in the mining operation.

It is an object of the present invention to overcome the foregoing drawbacks and to provide a chain guard housing for a drive chain which is glued to a longitudinal path, with means for the simple and easy removal of a portion of the guard without the need for extraneous tools and the like.

It is another object of the present invention to provide a chain guard housing for a mining arrangement including a mining conveyor having a drive chain disposed along one side thereof wherein a window opening means is provided in the guard to achieve such access to the chain portion under such guard with a minimum of effort and time,
utilizing inexpensive constructional elements which are durable and

It is still another object of the present invention to pro-

provide such a window opening in the chain guard housing

which is normally protected by a cover means disposed

across such window opening yet which is removably at-

tached to the guard to permit expedient manual removal

without the need for extraneous tools and which may be

restituted to a corresponding position in the same manner.

It is a still further object of the present invention to

provide such a window opening and cover means for the

guard whereby despite the ready access to the chain por-

tion thereat, such chain is completely shielded during

normal mining operations, not only with respect to mine per-

sonnel but also with respect to gases or particle material

being extracted which might otherwise enter the guard

space and obstruct the free movement of the chain and in

turn the over-all operation.

Other and further objects of the present invention will

become apparent from a study of the within specification

and accompanying drawings, in which

FIG. 1 is a perspective view of the guard in accordance

with the invention with the window opening exposed as

seen from the working face side of the conveyor, i.e., the

side remote from the mine face, with a part of the con-

veyor section shown as well, and

FIG. 2 is a perspective view of the cover plate used
to close off the window opening of the guard of FIG. 1.

It has been found, in accordance with the present inven-
tion, that a chain guard housing for a drive chain displace-
able along a longitudinal path may be provided which in its

broadest aspects comprises longitudinally extended

channel means having lateral edges as well as a longitudi-

nal channel groove defined therealong for receiving therein

the drive chain for displacement therealong, means defin-
ing a slot opening extending from one of the lateral edges

medially into the channel means for exposing the adjacent

portion of the channel groove, and a cover removably dis-

posed across the slot means for removal to provide thereat

working access to the channel groove and in turn the ad-

jacent portion of the drive chain enclosed by the housing.

Of course, mounting means for mounting the channel

means on a backing support are also contemplated whereby

by a drive chain disposed for travel along such backing

support may be protectively shielded by the chain guard

housing of the invention, yet with the provision for access
to the chain in a simple and reliable manner for the pur-

pose of tending to the chain to mend the same, for

example.

More specifically, the present invention concerns an im-

provement in a mining arrangement including a longi-

tudinally extending mining conveyor adapted to be posi-
tioned along the mine face to be worked, with a drive

chain positioned along one side of the conveyor for dis-

placement longitudinally therealong, a chain guard hous-

ing for the chain and mounting means mounting the hous-

ing on said one side of the conveyor, such improvement

comprising the provision for such chain guard housing in

the form of longitudinally extending channel means having

lateral edges as well as a longitudinal groove defined there-

along for receiving therein the drive chain for displace-

ment therealong, the longitudinal groove facing said one side

of the conveyor and the lateral edges extending toward said

one side to close off substantially the groove, means defin-
ing a slot opening extending from one of the lateral edges

medially into the channel means for exposing the adjacent

portion of the channel groove, and a cover removably dis-

posed across the slot opening means for removal to provide

thereat access to the channel groove and in turn the

adjacent portion of such drive chain.

Preferably, the slot opening means extends medially sub-

stantially to the center line of the conveyor. Also it is

advantageous to provide the conveyor in the form of a

plurality of individual conveyor sections articulatedly in-

terconnected in longitudinal end to end relation, and to

provide the channel means in the form of a plurality of

channel members disposed in longitudinal end to end rela-
tion, with each such channel member being mounted on

the appropriate conveyor section on one side of the con-

veyor and with each channel member having correspond-

ing lateral edges and a longitudinal groove defined there-

along for receiving a portion of the chain for displacement

therealong. In this instance, each channel member is

provided with a corresponding slot opening means extend-

ing medially substantially to the center line of the con-

veyor and a corresponding cover removably disposed ther-

ecross. Advantageously, the slot opening means is longi-

tudinally positioned intermediate the corresponding

longitudinal ends of the ground member.

Referring to the drawing, FIG. 1 shows a chain guard

housing or channel means in the form of channel mem-

ber 1 provided with a slot opening 2 extending from the

upper lateral edge 15 medially substantially to the center

line of channel member 1. Channel member 1 is disposed

on one side of conveyor section 13 at side wall 13'. In

accordance with the preferred embodiment of the inven-
tion, the conveyor is in the form of a plurality of articu-

latedly interconnected conveyor sections 13, only one of

which is shown, and appropriately each such conveyor

section 13 is provided with a channel member 1 disposed

in corresponding length so that a gap exists between the adja-

cent channel members 1 (only one of which is shown)

whereby the articulation of the conveyor sections may be

appropriately followed by the channel members 1 dis-

posed in longitudinal end to end relation in the same man-

ner as the conveyor sections.

The embodiment shows the side of the conveyor re-

 mote from the mine face, i.e. the working face side of

the conveyor, and appropriately a bounce plate or back-

ing plate 5 is disposed on side wall 13' of the conveyor

section to retain on the conveyor the mineralized material

extracted by the planer (not shown) disposed on the up-

per edge of the conveyor adjacent the mine face, which

material would otherwise overshoot the conveyor and land on the working face

side which would inconvenience the operation and even

represent a loss of valuable mineral. Thus, the chain

member 1 is mounted on the backing plate 5 via the

mounting means including the spacers 20 and the bolts

21 extending through spacers 20 (only one of which is

shown) and attached at the remote side of backing plate 5.

The use of backing plates is well known and an ar-

rangement showing this feature is found in U.S. Patent

2,823,908. In fact, backing plate 5 is attached to the side

wall 13' of the conveyor section 13 at the upper portion

18 and lower portion 19 thereof, either by welding or by

means of bolts. Alternatively, the side wall 13' may be

provided with a seating block in the V-shaped portion 13''

for connection with backing plate 5 by means of appro-

priate screw bolts (not shown). Thus, the channel mem-

ber 1 is effectively secured to the conveyor section 13 by

appropriate means, and to dismantle the channel member 1

require the use of tools to unscrew the bolts 21 whereupon reassembly would require aligning the

channel member 1 over the appropriate bolts 21 and even align-

ing spacers to assure unobstructed passage of the drive

chain disposed within longitudinal groove 23 defined by

the appropriate portion of the channel member 1.

In view of the manner of mounting channel member 1

onto the conveyor section 13, the channel member is

provided with vertical transversely disposed reinforce-

ment strips 12.

The channel member 1 actually includes a main wall

portion 24 and a pair of flange portions 25 and 26 where-

by to form a cowling of U-shaped cross-section. The

upper edge 15 of the flange portion 25 extends towards

the conveyor section 13 and more or less abuts backing

plate 5. On the other hand, channel member 1 of the

particular embodiment of the conveyor arrangement,

the lower edge 16 of flange 26 is spaced slightly from

backing plate 5 and conveyor section 13, more or less in
a downward direction from the lower portion 19 of the conveyor section 13, whereby to permit a slideshow 17 to be defined therealong which accommodates a connecting block 22 disposed in part with the longitudinal groove 23. The opposite end of connecting block 22 underlies the conveyor section 13 and is attached at the other side of the conveyor section with the mining planner (not shown) whereby the drive chain (not shown) accommodated in longitudinal groove 23 may be used to conduct the mining planner back and forth along the mine face in dependence upon the force exerted by the drive chain onto connecting block 22 to which the chain ends are connected for normal operations. This arrangement is utilized conventionally, as may be appreciated from a study of U.S. Patent 2,823,908.

In accordance with the particular aspects of the construction of the present invention, the window opening or slot opening 2, which is preferably positioned intermediate the longitudinal ends of channel member 1, is normally protected by a cover 3 disposed thereacross in a removable manner (FIG. 2). Cover 3 in the form of a cover plate of accurate configuration in conformity with the appropriate configuration of the surrounding portions of channel member 1 at slot opening 2 is provided with a pair of spaced apart lugs 6 along the upper edge 4 thereof adjacent the upper edge 15 of channel member 1. Lugs 6 are removably attachingly inserted into the first apertures 14 defined in backing plate 5 so as to shield the space between backing plate 5 and upper edge 4 of cover 3. Additionally, cover 3 is provided along the lower edge 7 thereof with a pair of spaced apart fingers 8 pivotally mounted at 80 onto cover 3, such fingers 8 being releasably lockingly inserted into the second apertures 9 in the longitudinal reinforcement seating means, such as a flange strip or bar 10, attached to the main wall portion of channel member 1 along the center line thereof at slot opening 2. In this manner, the mine workers may obtain access to the channel within groove 23 by merely pivoting fingers 8 out of the second apertures 9 and upwardly tilting cover 3 to draw the lugs 6 out of the first apertures 14. Simple removal and reinsertion of cover 3 is thus provided in accordance with the invention and when in place cover 3 is releasably lockingly reinserted sufficiently to shield slot opening 2 against a flying chain in the event of a channel rupture caused by excessive tension and against the undesired seepage of gangue or mineral, such as coal, in small particles or dust form into longitudinal groove 23.

It will be realized that in accordance with the construction of the present invention, the bar 10 serves also to reinforce the portion of channel member 1 adjacent the slot opening 2 together with the vertical reinforcing strips 12, and by the provision for an attachment means, for example in the form of a pivot opening 11, a transverse displacement means, such as a transverse hydraulically operated piston cylinder means, may be connected therewith for displacing the mining arrangement including the particular conveyor section 13 shown laterally in a direction toward the mine face. Arrangements for such conveyor displacement are disclosed in the aforementioned U.S. Patent 2,745,651, 2,691,514, and 2,781,888.

Accordingly, the present invention concerns a guard for covering chains on the working face side of a mining conveyor, in particular, used to drive a mining planner mounted for movement along the mining conveyor, with provision for a window opening normally closed off by a cover which is removable attached in a simple manner permitting access to the longitudinal groove and the drive chain in the event the chain must be repaired. The foregoing is achieved without the need for disassembling the entire guard housing or channel member, yet the cowling or channel member completely shields the chain during normal operations, not only from the workers but also against the seepage of gangue or mineral, such as coal, into the longitudinal groove.

Actually, in the preferred embodiment of the invention, the guard for the drive chain carried, for example, on the working face side of a mining conveyor and used to drive a mining planner arranged at the conveyor, is provided with the window-like opening in the middle area of the channel member and with such opening extending upwardly from the center line of the channel member to the uppermost edge thereof whereby such opening is easily sealed with a matching, removable cover plate, the removal being completely accomplished manually and without the need for tools or auxiliary equipment. The lugs or pins provided at the upper edge portion of the cover plate for insertion into the side plate or backing plate of the conveyor section contribute to the ready removal of the cover plate, yet provide the necessary structural rigidity once the cover plate is protectively positioned over the window opening. In the same way, the locking fingers at the bottom portion of the cover plate provide an equally favorable attachment with regard to the longitudinal bar provided on the channel member adjacent the medial edge portion of the window opening. Such bar, as aforesaid, advantageously serves not only for the longitudinal reinforcing of the cowling or channel member, which is otherwise interrupted by the window opening, but also provides a means for attaching an advancing cylinder of known type to advance the conveyor toward the mine face. Indeed, the reinforcing ribs or strips extending transversely from the upper to the lower edge portions of the channel member, especially those adjacent the window-like opening, serve to contribute additional rigidity, especially with regard to the forces transmitted to the channel member by the connecting block of the mining planner Keel guided in the known manner along the lower portion of the longitudinal groove.

It will be appreciated, therefore, that in accordance with a particular embodiment of the present invention, an improvement in a mining arrangement including a longitudinally extended mining conveyor section having means at the ends thereof adapted for articulatingly interconnecting such conveyor section in longitudinal end to end relation with further conveyor sections for disposition of such arrangement along a mine face to be worked, a chain guard housing disposed along one side of the conveyor section for a drive chain adapted to be positioned along said one side of the conveyor section for displacement longitudinally therealong, and means mounting the housing on said one side of the conveyor section, is provided, such an improvement contemplating the construction of the chain guard housing in the form of a longitudinally extending channel member substantially coextensive with the conveyor section and having lateral edges adjacent the upper portion and lower portion correspondingly of the said one side wall of the conveyor section as well as a longitudinal groove defined along the channel member and adapted for receiving therein such drive chain for displacement therealong, with the longitudinal groove facing said one side of the conveyor section and with the lateral edges extending toward said one side to close off substantially the groove, means defining a slot opening extending from one of the lateral edges medially into the channel member for exposing an adjacent portion of the channel groove, and a cover removably disposed across the slot opening means for removal to provide thereat access to the channel groove. In particular, the slot opening means extends medially substantially to the center line of the channel member from the lateral edge adjacent the upper portion of the said one side wall of the conveyor section, and the slot opening means is positioned longitudinally intermediate the longitudinal ends of the conveyor member.

It will be realized by the artisan that the improvement in accordance with the invention may be utilized in chain guard housings positioned on conveyors of the most varied types, i.e. those in which the guard housing normally includes both the forward and return strands of the guard.
3,343,880

chain or only one of such strands, and those which are spaced from the corresponding conveyor assembly sufficiently to prevent the block to pass in a slide way between the housing and the conveyor in the manner described above, whether such spacing provides the slide way adjacent the lower end of the housing or adjacent the upper end of the housing. The improvement of the invention is directed more especially to the constructional arrangement of a guard housing permitting ready access to the longitudinal groove therewithin, regardless of whether such housing is disposed on the side of the conveyor adjacent the mine face or on the side thereof remote from the mine face, and regardless of whether a keel-type planer or other type planer is utilized and regardless of whether any appropriate slide way is located at the lower end or at the upper end portion of the guard housing or channel member.

It will be further appreciated by the artisan that the shape of the slot opening 2 may be varied as desired, and that the particular means for removably attaching the cover plate over the slot opening 2 may vary so long as the attachment of the appropriately shaped cover plate is simple, rigid when in place, and removed without the need for auxiliary tools or equipment.

It will be appreciated that the instant specification and drawing are set forth by way of illustration and not limitation, and that various modifications and changes may be made without departing from the spirit and scope of the present invention which is to be limited only by the scope of the appended claims.

What is claimed is:

1. Chain guard housing for a drive chain displaceable along a longitudinal path, which comprises longitudinally extending channel means having lateral edges and having a longitudinal groove defined therealong for receiving therein such drive chain for displacement therealong, mounting means for mounting said channel means on said side of the conveyor, and means defining a slot opening extending from one of said lateral edges medially into said channel means for exposing the adjacent portion of said channel groove, and a cover removably disposed across such slot opening means for removal to provide access to said channel groove thereon.

2. In a mining arrangement including a longitudinally extending mining conveyor section having means at the ends thereof adapted for articulately interconnecting such conveyor section in longitudinal end to end relations with further conveyor sections for disposition of such arrangement along a mine face to be worked, a chain guard housing disposed along one side of said conveyor section for a drive chain adapted to be positioned along said one side of said conveyor section for displacement longitudinally therealong, and mounting means mounting said housing on said one side of the conveyor section, the improvement which comprises providing said channel guard housing in the form of a longitudinally extending channel member substantially coextensive with said conveyor section and having lateral edges adjacent the upper portion and lower portion of said channel groove, said said conveyor section as well as a longitudinal groove defined along said channel member and adapted for receiving therein such drive chain for displacement therealong, said longitudinal groove facing said one side of said conveyor section and said lateral edges extending toward said one side to close off substantially said groove, means defining a slot opening extending from one of said lateral edges medially into said channel member for exposing the adjacent portion of said channel groove, and a cover removably disposed across such slot opening means for removal to provide access to said channel groove thereon.

3. Improvement according to claim 2 wherein said slot opening means extends medially substantially to the center line of said channel means.

4. Improvement according to claim 3 wherein said conveyor is in the form of a plurality of individual conveyor sections articulatedly interconnected in longitudinal end to end relation correspondingly including a plurality of channel members disposed in longitudinal end to end relation, each such channel member being mounted on the appropriate conveyor section on said one side of the conveyor and each having corresponding lateral edges and

a longitudinal groove defined therealong for receiving a portion of said channel for displacement therealong, and each said channel member having a corresponding slot opening means extending medially substantially to the center line of such channel member and a corresponding cover removably disposed thereacross.

5. Improvement according to claim 4 wherein each such slot opening means is longitudinally positioned intermediate the connecting longitudinal ends of the particular channel member.

6. In a mining arrangement including a longitudinally extending mining conveyor section having means at the ends thereof adapted for articulately interconnecting such conveyor section in longitudinal end to end relations with further conveyor sections for disposition of such arrangement along a mine face to be worked, a chain guard housing disposed along one side of said conveyor section for a drive chain adapted to be positioned along said one side of said conveyor section for displacement longitudinally therealong, and mounting means mounting said housing on said one side of the conveyor section, the improvement which comprises providing said channel guard housing in the form of a longitudinally extending channel member substantially coextensive with said conveyor section and having lateral edges adjacent the upper portion and lower portion of said channel groove, said said conveyor section as well as a longitudinal groove defined along said channel member and adapted for receiving therein such drive chain for displacement therealong, said longitudinal groove facing said one side of said conveyor section and said lateral edges extending toward said one side to close off substantially said groove, means defining a slot opening extending from one of said lateral edges medially into said channel member for exposing the adjacent portion of said channel groove, and a cover removably disposed across such slot opening means for removal to provide access to said channel groove thereon.

7. Improvement according to claims 6 wherein said slot opening means extends medially substantially to the center line of said channel member from the lateral edge adjacent the upper portion of said one side wall of said conveyor section and said slot opening means is positioned longitudinally intermediate the longitudinal ends of said channel member.

8. Improvement according to claim 7 wherein said cover is provided along the portion thereof adjacent said one of the lateral edges with a pair of spaced apart lug means and said conveyor section is provided at said one side thereof with a corresponding wall portion thereof containing means defining a pair of spaced apart corresponding first apertures into which said lug means are removably attachingly inserted, and wherein said cover is provided along the portion thereof adjacent said center line of the channel member with a pair of spaced apart pivotally mounted finger means and said channel member is provided at the portion thereof adjacent said center line with longitudinal reinforcement seating means containing therein means defining a pair of spaced apart corresponding second apertures into which said finger means are releasably lockingly inserted, whereby said cover may be removably lockingly disposed across said slot opening means.

9. Improvement according to claim 8 wherein said channel member is provided with a plurality of reinforcing strip means extending transversely from one said lateral edge to the other across the surface of said channel member remote from said channel groove, and wherein said seating means includes a flange strip containing said second apertures as well as attachment means adapted for attaching thereto a transverse displacement means for displacing such mining arrangement laterally in a direction toward the mine face.

10. Improvement according to claim 9 wherein the lateral edge adjacent the lower portion of said one side wall of said conveyor member is spaced slightly from said
one side wall whereby to form an elongated slideway between said lower portion of said one side wall and said lateral edge adjacent said lower portion of said one side wall to accommodate therealong a portion of a mining planer connecting member adapted to be slidably positioned therealong for attachment with such drive chain for driving such planer thereby.

11. Guard housing for drive chain movable along a longitudinal path, which comprises longitudinally extending main wall means, a pair of laterally directed flange means extending from said main wall means, to form therewith a longitudinally extending cowling of substantially U-shaped cross-section defining a longitudinal groove therealong, said cowling being adapted to be positioned on a backing support and adapted to receive the drive chain in the groove between said adjacent wall means and flange means thereat, means defining a window opening extending from the outer edge of one of said flange means medially through said flange means and through a portion of said main wall means for exposing the adjacent portion of said groove, and a cover removably disposed across said means defining a window opening for removal to provide working access to said groove thereat and in turn such drive chain.

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ERNEST R. PURSER, Primary Examiner.
UNITED STATES PATENT OFFICE
CERTIFICATE OF CORRECTION

Patent No. 3,343,880 September 26, 1967

Alois Hauschopp

It is hereby certified that error appears in the above numbered patent requiring correction and that the said Letters Patent should read as corrected below.

In the heading to the printed specification, line 5, for "Gerwerkschaft" read -- Gewerkschaft --; column 6, line 38, for "convneyor" read -- conveyor --; column 8, lines 14 and 15, for "relationi" read -- relation --.

Signed and sealed this 29th day of October 1968.

(SEAL)
Attest:
Edward M. Fletcher, Jr.
Attesting Officer

EDWARD J. BRENNER
Commissioner of Patents