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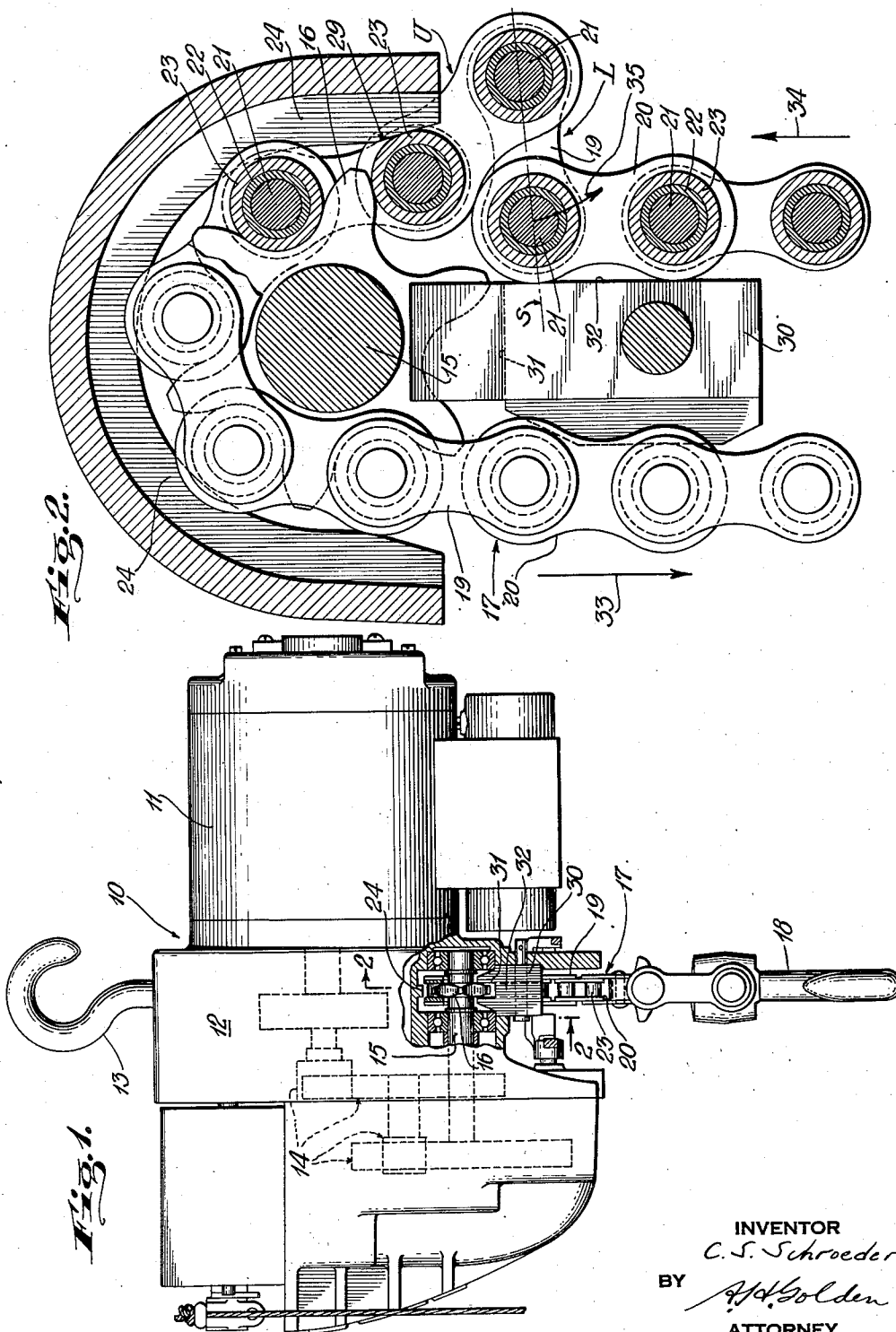
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CHAIN HOIST

Filed April 24, 1942

2 Sheets-Sheet 1



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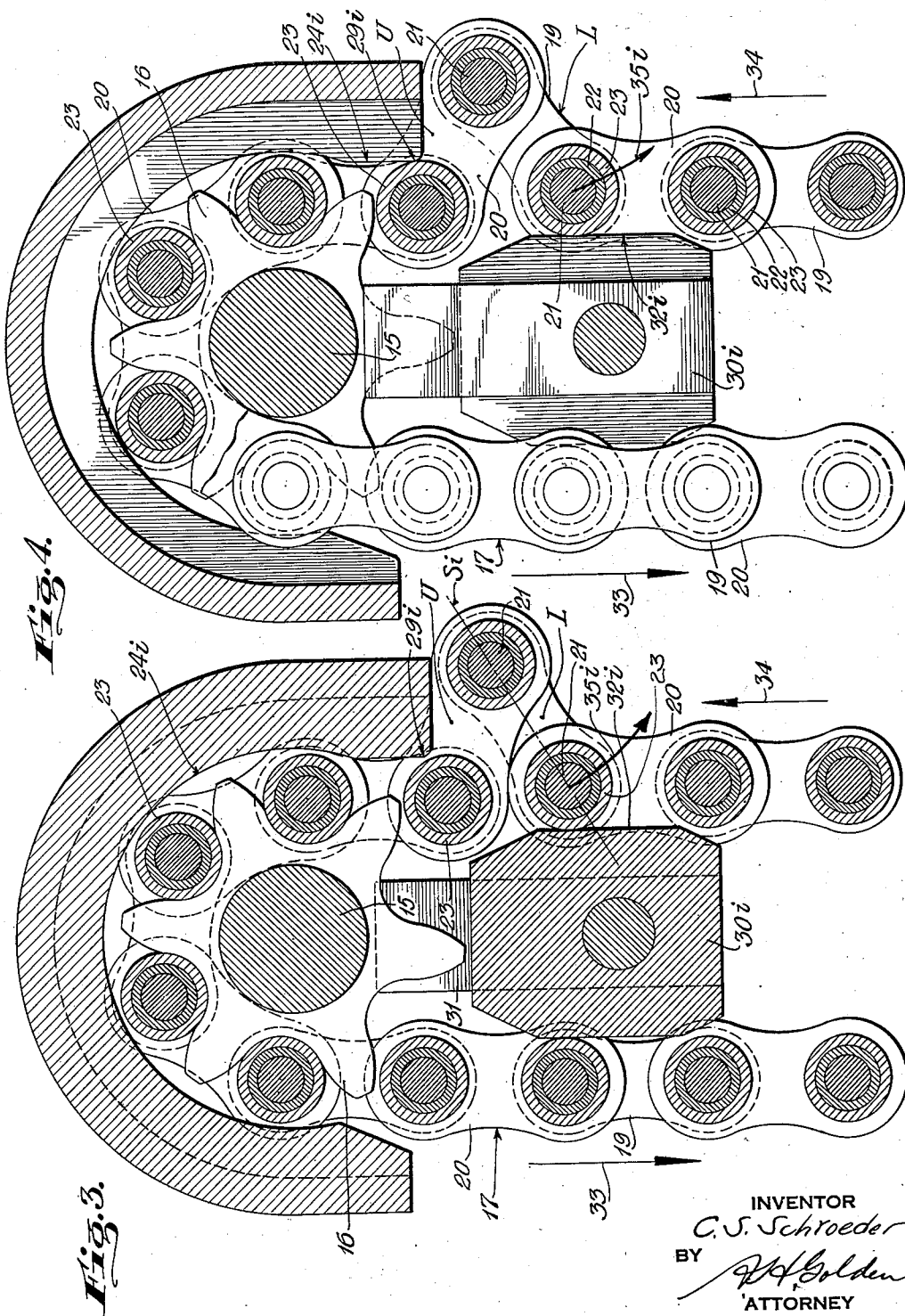
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UNITED STATES PATENT OFFICE

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CHAIN HOIST

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6 Claims. (Cl. 254—168)

This invention relates to a hoist of the type in which a link chain is driven by a sprocket for raising and lowering a load. Hoists of the particular type comprise a mounting member which is supported by a hook or trolley, and which carries an electric motor that through a system of gearing, rotates the sprocket with which the chain is in contact.

In hoists of this type, means are usually required to maintain the chain on the sprocket, especially where the chain is driven at relatively high speeds, and such means are normally in the form of a guide surface that is spaced from the periphery of the sprocket a predetermined amount so as to allow free movement of the chain between the guide surface and the sprocket. Any tendency of the chain to leave the sprocket is overcome by the guide surface through its cooperation with the rollers of the load chain.

In a hoist of the particular class, a stripper is employed for stripping the chain from the sprocket as the chain moves away from the sprocket. This stripper is particularly important on the slack side of the chain as the load is being raised, the chain having a normal tendency to remain in contact with the teeth of the sprocket, as those skilled in the art will fully appreciate.

My invention relates particularly to means for overcoming the tendency of the chain to jam and break as the load is being lowered, due to the ineffectiveness of the usual stripper and the chain guide means to align the links of the slack side of the chain as those links are moved toward the sprocket teeth. In other words, in the hoists of the prior art, there are present rather effective means for stripping the links of the slack side of the chain from the sprocket as the load is elevated, but there are no suitable means for guiding and aligning the links of the slack side of the chain as they move toward the sprocket when the load is being lowered. Because of this lack of guiding and aligning means in prior art structures, it frequently happens that the chain is jammed or broken just prior to engagement with the sprocket.

An important feature of my invention is the provision of means for guiding the chain links into suitable alignment just prior to their engagement with the sprocket, so as to obviate the breakage of the links, all as will be appreciated by those skilled in the art. More particularly, it is a feature of my invention that a part of the guiding means are formed as part of the stripper, while another part is formed as a

portion of the guide surface that is used to maintain the chain links in engagement with the sprocket.

While I have thus described generally the more important features of my invention, other valuable features will become apparent upon the reading of the detailed description which follows. Also, while I shall set forth what I consider is the best theory of operation of my invention, it should be understood that I do not wish my patent to be limited by that theory of operation. Also, those skilled in the art will fully appreciate that the basic conception of my invention may be incorporated in structural forms other than those which I shall herein describe, and that my patent claims should be sufficiently broad to prevent the utilization of that basic conception in such other forms.

Referring now to the drawings, Fig. 1 is a vertical view and partial section illustrating a chain hoist of the type to which my invention is applicable. Fig. 2 is a section taken along lines 2—2 of Fig. 1 illustrating just how a link chain may jam and break in one of the present chain hoist structures. Fig. 3 is a view similar to Fig. 2 but showing a form of chain guide mechanism developed in accordance with the teachings of my invention and adapted to prevent the jamming and breaking which occurs in the type of structure illustrated in Fig. 2. Fig. 4 illustrates the action of the parts of Fig. 3 in guiding or camming the chain links into proper alignment.

Referring now more particularly to the drawings and especially Fig. 1, I illustrate there a usual type of link chain hoist designated by reference numeral 10 and comprising an electric motor 11 supported relatively to a main mounting member 12, that is in turn adapted for support by a hook 13. The motor 11 is adapted, through a system of gearing designated generally by reference numeral 14, to drive a shaft 15 on which is formed a sprocket 16. It is the rotation of the shaft 15 and its sprocket 16 in a manner that is well understood by those skilled in the art, that effects the vertical lifting and lowering of the load chain 17 to which is secured a load hook 18.

Referring now to Fig. 2, the sprocket 16 is shown in engagement with the chain 17. This chain 17 comprises outer link plates 19 and inner link plates 20. The outer link plates 19 are connected by pins 21 which pass through sleeves 22 connecting the inner link plates 20. In this way, the outer link plates rotate relatively to the inner link plates about the pins 21 all in

the usual manner understood by those skilled in the art. Rollers 23 surround the sleeves 22 and it is these rollers that are in actual engagement with the teeth of the sprocket 16 to contribute easy non-frictional coaction between the sprocket teeth and the chain. Those skilled in the art will fully appreciate and understand that the construction of the chain and its coaction with the sprocket teeth is well known in the art and forms no part of my contribution.

In Fig. 2, the mounting member 12 is shown with a guide surface 24 that is adapted to cooperate with the surfaces of the several rollers 23 to maintain the rollers in engagement with the teeth of the sprocket 16 as the sprocket is rotated. Surface 24 is also shown in Fig. 1 in proper relation to the sprocket 16. The necessity of the outer guide surface 24 has already been discussed in some detail and will now be understood. The stripper which I use is designated by reference numeral 30 and as is best shown in Fig. 1, is slotted at 31 for the passage of the sprocket 16, the chain being stripped from the sprocket since it cannot pass through the slot 31. The slack side of the chain is thus carried away from the sprocket and down past the surface 32 of the stripper 30 all in a manner well known in the art.

When the load is being lowered in the direction of the arrow 33 the slack side of the chain will move toward the sprocket in the direction of the arrow 34. If now it be assumed that the chain has kinked as much as is possible, and through friction between the links caused by the entry of foreign material, it is held kinked, then a group of links will actually assume the position illustrated in Fig. 2. There, it will be noted that the upper roller 23 of the upper link U is in contact with the portion 29 of guide surface 24 located at the entrance to the space between the guide surface 24 and the sprocket 16. The link L immediately below the upper link U is positioned relatively to the surface 32 of the stripper so that the line S running between its two pivot shafts 21, will be practically at right angles to the stripper surface 32. It is quite obvious that the pull on the upper link U relatively to the lower link L will be ineffective to cam the lower link L in the direction of the arrow 35 as is necessary if it be desired to align properly the lower link L with the upper link U to direct the chain toward the sprocket 16. In other words, because of the nearly normal relation between the line S and the surface 32, it will not be possible to overcome the friction holding the links in the kinked position of Fig. 2. In actual practice it has been found that where the chain kinks as illustrated in Fig. 2, it will actually jam and be broken by the sprocket as will be quite apparent to those skilled in the art. It is to obviate the difficulties illustrated in Fig. 2 that my invention has been developed.

Referring now to Fig. 3 the guide surface cooperating with the outer portions of the several link chain rollers 23 is designated by reference numeral 24i, the letter i being chosen to represent the improved form. The stripper in Fig. 3 is designated by reference numeral 30i, and the guide surface on the slack side thereof is designated by reference numeral 32i. It will be noted that the surfaces 24i and 32i are so formed that when the upper roller 23 of the upper link U is in contact with the entrance surface portion 29i, of guide surface 24i, the lower roller 23 of the lower link L is in contact with the surface 32i.

The relation of the surfaces 29i and 32i is such, however, that upper link U is in a more nearly horizontal position than that which it occupied in Fig. 2; due to the fact that lower link L is in a more angular position relatively to surface 32i. The line Si is at a considerable angle from the normal relatively to surface 32i, so that the friction between the links may then more easily be overcome. It is, therefore, possible for the upper link U to effect the camming of the lower link L by surface 32i in the direction of the arrow 35i so as to move the lower link L into proper alignment with the upper link U and the sprocket 16 all as is now quite apparent.

In Fig. 4 I illustrate the parts of Fig. 3 with the lower link L partially cammed out of kinked relation to the upper link U, and about to be cammed further in the direction of the arrow 35i. It can now be seen that by a very simple change of the guide surfaces for the chain, I do effectively prevent the jamming of the links thereof.

I now claim:

1. In a hoist of the class described, a sprocket, a chain movable over said sprocket, an outer chain guide surface offset from the periphery of the sprocket teeth and cooperable with the outer surfaces of the chain to maintain the chain on said teeth, an inner chain guide surface positioned for cooperating with the inner chain surfaces in advance of said sprocket so as to guide the chain toward the sprocket, said guide surfaces being positioned and of such extent that they prevent the chain links when kinked, from assuming a particular angular position relatively to said guide surfaces just prior to moving into engagement with the sprocket wherein pull on the chain by the sprocket will be effective to jam the chain links against said guide surfaces, said guide surfaces holding said links so that a pull thereon cams said links into proper alignment.

2. In a hoist of the class described, a sprocket, a link chain movable over said sprocket, an outer chain guide surface offset from the periphery of the sprocket teeth and cooperable with the outer surfaces of the chain to maintain the chain on said sprocket teeth, an inner chain guide positioned in advance of the sprocket and cooperating with the inner surfaces of the chain links, an entrance surface on said outer chain guide for guiding the links of the chain towards said sprocket, the surface of said inner chain guide being positioned relatively to said entrance surface so that the next lower link pivoted to a link lying against said entrance surface will lie against said inner guide at such an angle when kinked relatively to said upper link, as to be cammed by said guide surface toward proper alignment with the upper link as the upper link exerts pull thereon.

3. In a hoist of the class described, a sprocket, a link chain movable over said sprocket, an outer chain guide surface offset from the periphery of the sprocket teeth and cooperable with the outer surfaces of the chain to maintain the chain on said teeth, an inner chain guide cooperating with the inner surfaces of the chain links, an entrance surface on said outer chain guide for guiding the links of the chain towards said sprocket, the surface of said inner chain guide being positioned relatively to said entrance surface so that the next lower link pivoted to an upper link lying against said entrance surface and in kinked relation to said upper link will lie against said inner guide at a sufficiently substantial angle whereby to be cammed by said inner guide surface toward

proper alignment with the upper link as the upper link exerts pull thereon, substantially as shown and described.

4. In a hoist of the class described, a sprocket, a link chain movable over said sprocket, an outer link chain guide cooperable with the outer surfaces of the links of said chain as they approach the sprocket for guiding them relatively to the sprocket, an inner link chain guide cooperable with the inner surfaces of said links as they approach the sprocket, the surface of said inner chain guide being positioned relatively to the surface of said outer chain guide so that the next lower link pivoted to an upper link lying against the surface of the outer chain guide, and in kinked relation to said upper link, will lie against said inner guide at such an angle as to be readily cammed by said inner guide toward proper alignment with the upper link as the upper link exerts pull thereon.

5. In a hoist of the class described, a sprocket, a link chain movable over said sprocket, an outer link chain guide cooperable with the outer surfaces of the links of said chain as they approach the sprocket for guiding them relatively to the sprocket, an inner link chain guide cooperable with the inner surfaces of said links as they approach the sprocket, the said chain moving relatively to said sprocket and guides whereby to have an upper link in contact with the outer link chain guide as the next lower link pivoted to said upper link is in contact with the inner

link chain guide, the said guides being formed substantially as shown and described so that when the said upper link is in contact with the outer link chain guide the said next lower link when kinked relatively to said upper link will be positioned by said inner guide at such an angle relatively thereto as to be readily cammed by said inner guide toward proper alignment with the upper link and sprocket as the upper link exerts pull thereon.

6. In a hoist of the class described, a sprocket, a link chain movable over said sprocket, an outer chain guide surface offset from the periphery of the sprocket teeth and cooperable with the outer surfaces of the chain to maintain the chain on said teeth, a stripper positioned below the sprocket and having a guide surface cooperating with the inner surfaces of the chain links, an entrance surface on said outer chain guide for guiding the links of the chain towards said sprocket, the surface of said stripper against which the inner surface of said links may impinge being positioned relatively to said entrance surface so that the next lower link pivoted to an upper link lying against said entrance surface, and in kinked relation thereto, will lie against said stripper surface at such an angle as to be cammed by the stripper surface toward proper alignment with the upper link as the upper link exerts pull thereon.

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