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2,116,116

METHOD OF FORMING TWISTED CHAIN LINKS

Filed Sept. 30, 1936

Fig. 1.

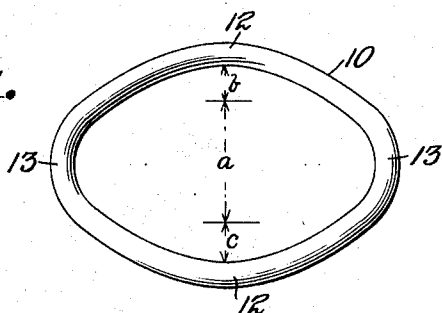


Fig. 2.

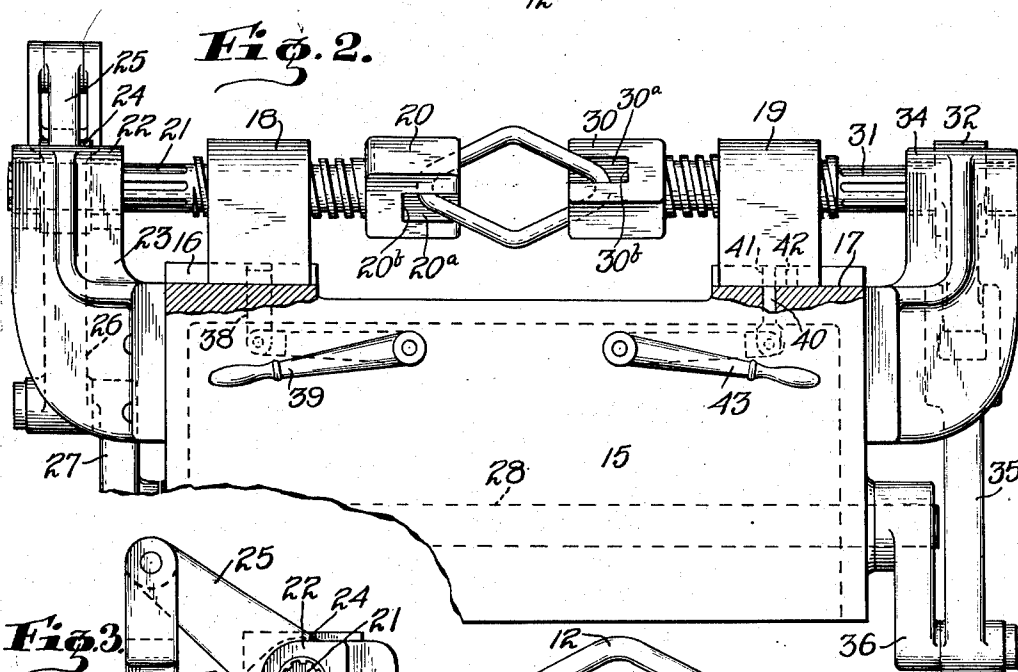


Fig. 3.

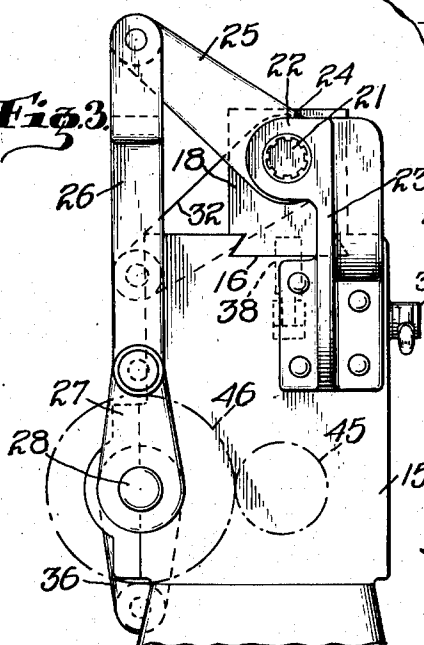


Fig. 4.

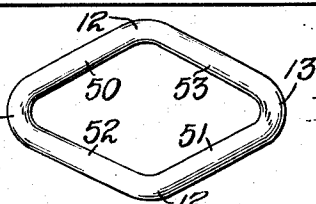


Fig. 5.

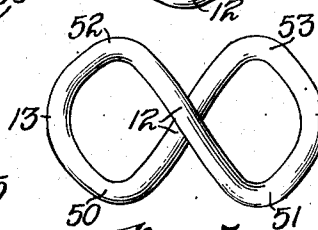
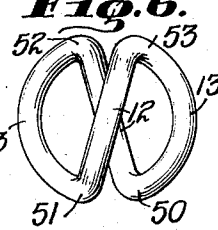


Fig. 6.



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METHOD OF FORMING TWISTED CHAIN LINKS

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4 Claims. (Cl. 59—35)

The present invention relates to a novel method of forming twisted chain links having widely spaced side elements.

In making an ordinary curb link, one end of a flat link is twisted with respect to the other, usually through an angle of about 85 degrees to 90 degrees, and during the twisting operation the sides of the link are drawn inwardly toward each other. Such lateral contraction of the link increases with the degree of twist, and the sides will be brought into contact with each other if the twist is carried far enough, the degree of twist that will produce this result being less than 180 degrees by an amount which varies with the thickness of the link stock.

In certain conditions, it is desirable to provide a twisted chain link having its side elements widely spaced apart. For example, in tire chains adapted for use in mud, soft earth, sand, etc. cross chain links which stand out from the tire and present a broad projected area transverse to the line of travel, will offer a high resistance to slippage of the tire. In Patent No. 2,053,047, issued September 1, 1936, there is described such a link in which the relative twist of one end with respect to the other may be as much as 180 degrees, while the side elements are spaced apart by distance considerably greater than half the length of the link. In its preferred form the link is of saddle-like form with substantially parallel arcuate side elements and substantially parallel arcuate end elements all of substantially the same radius, but with the axis of the side elements forming an oblique angle with the axis of the end elements. The present invention has for an object to provide a novel method of making such links, as well as other forms of twisted links in which the side elements are widely spaced apart.

A more specific object of my invention is to compensate for the contraction of the link during the twisting operation by predetermining the amount of such contraction and giving the link an initial form, such that after the twisting operation it will be drawn to the desired spacing of its parts.

Another object of my invention is to overcome or at least to oppose the lateral contraction of a link during the twisting operation by giving the side elements a lateral bulge before the twisting step and applying endwise compression to the link during the twisting step. This application of endwise compression may be used without any excess initial spread of the side elements provided the said side elements are initially bulged, or, in accordance with my preferred method, initial excess spread and endwise compression may both be

employed to secure the desired spread in the finished link.

Other objects will appear in the following description of my invention as carried out with the aid of certain apparatus and thereafter the novelty and scope of the invention will be set forth in the claims.

In the accompanying drawing;

Figure 1 is a plan view of a flat link which has been preformed to compensate for lateral contraction while it is being twisted so that there will be a predetermined wide spread of the side elements in the finished link;

Fig. 2 is a view in side elevation of an apparatus for twisting the links;

Fig. 3 is a left hand end view of said apparatus; and

Figs. 4, 5 and 6 show the finished link as viewed in plan, side elevation and end elevation, respectively.

The link shown in Fig. 1 comprises an elongated closed flat loop 10 having bulging side portions 12 connected by curved end portions 13. When one end of the link is twisted with respect to the other the link will contract laterally and endwise as well, but ordinarily there will be a greater lateral contraction than endwise contraction. The first step of the process is to form a flat link of such contour and dimensions as will allow for the contraction that takes place during the twisting step. If a median lateral spacing a is required in the finished link and it has been determined that one side will be drawn inwardly to an extent b and the other to an extent c then the flat link must be initially formed with a median spacing of the sides equal to the sum of a , b and c . If the opposite sides of the link are not symmetrical with respect to the axis of twist, one side may be drawn inwardly to a greater extent than the other. In other words, b may be greater or less than c . The actual lateral contraction may be determined empirically for a given run of links by twisting one or more samples to determine just how much contraction must be allowed for.

The flat loop or link may be made in the usual manner with the side elements parallel and then the sides may be spread laterally to the requisite extent, or the link may be made initially on a form that provides the lateral spread called for. This spread will depend upon the subsequent treatment of the link. If, for instance, the link is compressed endwise while it is being twisted the lateral contraction will be reduced. If sufficient endwise compression is employed the entire contraction of the link may take place along the

major axis of the link and there may even be a greater spread of the sides in the finished twisted link than in the initial flat link. In any case, where endwise compression is employed the sides of the link must be bulged away from the axis of compression so that the resultant lateral thrust in the side elements will be outward.

An apparatus for twisting the links either with or without endwise compression, is shown in in Figs. 2 and 3. This apparatus comprises a main frame 15 provided with a pair of undercut slide-ways 16 and 17 in which are mounted slide blocks 18 and 19, respectively. These blocks are adapted to support a pair of twisting jaws 20 and 30, respectively. The twisting jaw 20 is provided with a stem 21 which is threaded through the slide block 18. The stem also passes through a bearing 22 in which it is free to rotate and also to slide lengthwise. This bearing is formed in a bracket 23 secured to the main frame 15. The bearing 22 is bifurcated to receive between the furcations the hub 24 of an arm 25. The stem 21 passes through the hub and is splined to engage the same so that the stem may slide axially through the hub, but when the arm is swung about the axis of the stem it will cause corresponding rotational movement of the stem 21 and jaw 20. The outer end of the arm 25 is connected by a link 26 to a crank 27 fixed to a shaft 28.

The opposite twisting jaw 30 is similarly mounted, comprising a stem 31 which has threaded engagement with the slide block 19 and splined engagement with an arm 32 mounted in a bifurcated bracket 34. A link 35 connects the free end of the arm 32 to a crank 36 fixed to the shaft 28. The crank 36 is set at an angle of 180 degrees to the crank 27 so that upon rotation of the shaft 28 the arm 24 will be swung downwardly while the arm 35 is swung upwardly, and vice versa. By this means, the jaws 20 and 30 are twisted in opposite directions and by reason of the threaded engagement of the stems 21 and 31 with the slide blocks 18 and 19 the jaws are moved inwardly as they are twisted, it being understood that the thread on stem 31 is in the same direction as the thread on stem 21. The blocks 18 and 19 are held stationary during the twisting operation and to this end a pin 38 is mounted to slide vertically in the frame 15 to engage a hole in the bottom of the block 18. The pin may be withdrawn from the block whenever desired by means of an operating handle 39. Similarly, a pin 40 is mounted to slide vertically in the main frame 15 to engage one or the other of a pair of holes 41 and 42 formed in the slide block 19. A handle 43 is provided for moving the pin into and out of engagement with the slide block 19, as desired.

The shaft 28 is preferably rotated by power means applied thereto through a drive pinion, indicated diagrammatically at 45 in Fig. 3, and engaging a gear wheel 46 mounted on the shaft 28. A clutch, not shown, may be provided between the gear wheel 46 and the shaft 28, or between the drive wheel 45 and the source of power, which will disengage automatically at each half turn of the shaft 28, the clutch being manually engaged as desired.

The jaws 20 and 30 are provided with transverse slots 20a and 30a, respectively, to receive the opposite ends of the link to be twisted. If the twisting is to be effected without endwise compression the block 19 is withdrawn to the posi-

tion shown in full lines in the drawing with the pin 40 engaging the hole 41. If, however, compression is to be employed, the slide block 19 is advanced toward the slide block 18 sufficiently for the pin 40 to engage the hole 42. In the latter position, the spacing between the jaws 20 and 30 is such that the ends of the link will bear against the inner end walls 20b and 30b, respectively, of the slots 20a and 30a.

In operation, the shaft 28 is turned to bring the slots 20a and 30a into parallel and the link is then inserted in the slots between the jaws. Thereafter, the clutch is engaged to cause a half turn of the shaft 28 and this will result in a twist of jaw 20 in one direction while the jaw 30 twists in the opposite direction. The degree of such twisting will depend upon the setting of the machine. In the particular machine illustrated the parts are so proportioned that while one jaw is twisted through an angle of 75 degrees clockwise, the other will be turning through an angle of 75 degrees counterclockwise, thus giving the link a total twist of 150 degrees. As the link is twisted, it tends to contract laterally and lengthwise as well. The screw threads connecting the stems 21 and 31 with slide blocks 18 and 19, respectively, are of such pitch as to more than compensate for the endwise contraction of the link. Such compensation, however, plays no important part in the process, as long as the block 19 is in its retracted position and in such case the lateral contraction of the link will be compensated for solely by the extra spacing of the sides of the link in the flat link before the twisting operation. When the block 19 is advanced to such position that the ends of the links bear against walls 20b and 30b, respectively, the twisting operation will result in an over contraction of the link endwise which due to the bulge of the side of the link will resist lateral contraction.

After the twisting operation has been completed the pin 38 is withdrawn, permitting the slide block 18 to be moved outwardly so that the link that has been twisted may be withdrawn from the twisting jaws. Thereafter, the block 18 is again moved to its normal position and engaged by the pin 38 and the clutch is engaged to cause a further half turn of the shaft 28 which will effect a return of the jaws to their initial position.

While I have described a specific apparatus for carrying out the twisting and compressing steps of my invention it will be understood that my process is not limited to the use of any specific apparatus.

A link which has been formed in accordance with my invention is shown in Figs. 4, 5 and 6. As shown in the end view (Fig. 6) the link has been twisted through an angle of 150 degrees. In plan, the link is lozenge shaped and in side elevation it has the projected form of a figure "8". It will be noted that there is a wide median spacing of the side elements. Actually, the twisted link is of distorted saddle shape comprising two opposite concave arcuate sections 50 and 51 connected by a pair of convex arcuate sections 52 and 53 all of approximately the same radius but with the axis of sections 50 and 51 forming an oblique angle with the axis of the other two sections. I wish it also to be understood, however, that my invention is not limited to the making of the particular link illustrated, but I may use my process to make other forms of twisted links in which the side elements are widely spaced apart.

I claim:

1. The method of making a twisted chain link having one end twisted more than 90 degrees with respect to the other while the sides of the link have a median spacing considerably greater than half the length of the link, which method consists in forming an elongated flat closed loop, predetermining the lateral contraction that will take place in the loop when twisted to the desired degree without the interposition of a spacer between the sides of the loop, providing a median spacing of the sides of the loop equal to the desired spacing in the finished product plus an amount sufficient to compensate for such lateral contraction, and thereafter producing a relative twist of the ends of the loop to said desired degree.

2. The method of making a twisted chain link having one end twisted more than 90 degrees with respect to the other while the sides of the link have a median spacing considerably greater than half the length of the link, which method consists in forming an elongated flat closed loop, predetermining the lateral contraction that will take place in the loop when twisted to the desired degree, providing a median spacing of the sides of the loop equal to the desired spacing in the finished product plus an amount sufficient to

compensate for such lateral contraction, and thereafter producing a relative twist of the ends of the loop to said desired degree and simultaneously compressing the loop endwise.

3. The method of forming a twisted chain link with the sides of the link having a predetermined median spacing greater than half the length of the link, which consists in forming a flat closed loop with bulging sides, relatively twisting the ends of the loop, and simultaneously with the twisting operation compressing the loop endwise to oppose the lateral contraction of the loop.

4. The method of forming a twisted chain link with the sides of the link having a predetermined median spacing greater than half the length of the link, which consists in forming a flat closed loop with bulging sides, relatively twisting the ends of the loop and simultaneously with the twisting operation compressing the loop endwise to oppose the lateral contraction of the loop, and prior to the twisting step spreading the sides of the loop apart to such an extent as to compensate for any lateral contraction that may occur during the twisting operation so as to obtain the predetermined median spacing in the finished product.

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