No. 746,287. PATENTED DEC. 8, 1903.

D. CARROLL.

METHOD OF MAKING CHAIN LINKS.

APPLICATION FILED DEC. 7, 1901.

NO MODEL.

Fig. 1

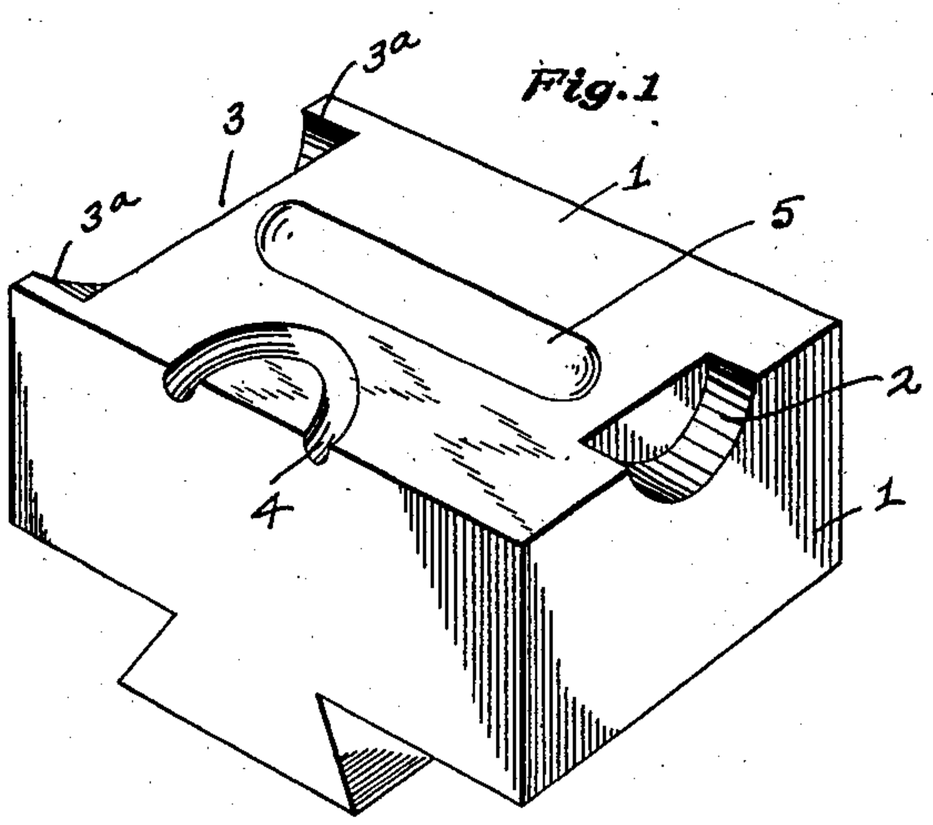


Fig. 2

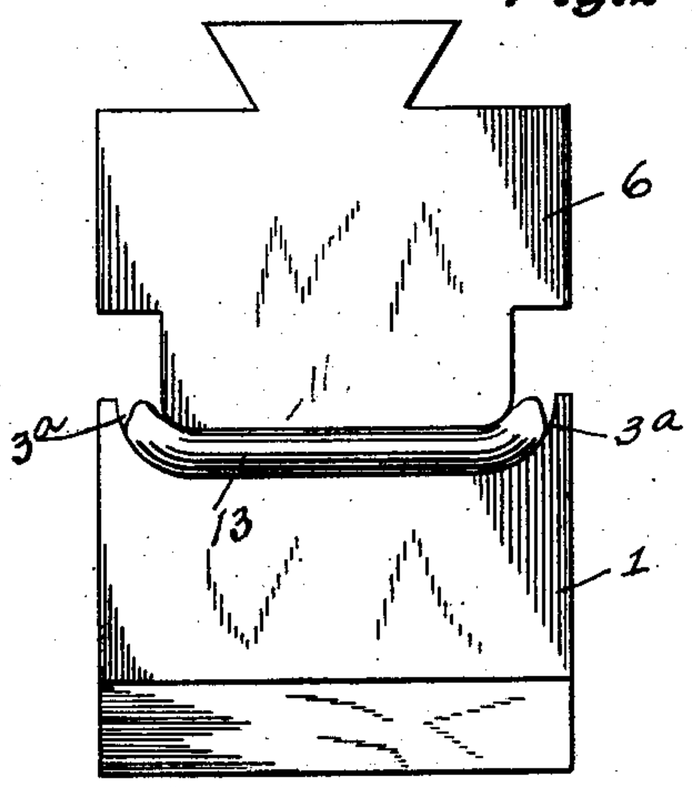


Fig. 3

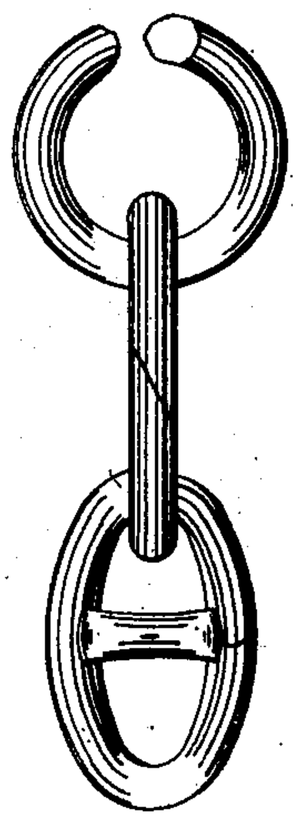


Fig. 4

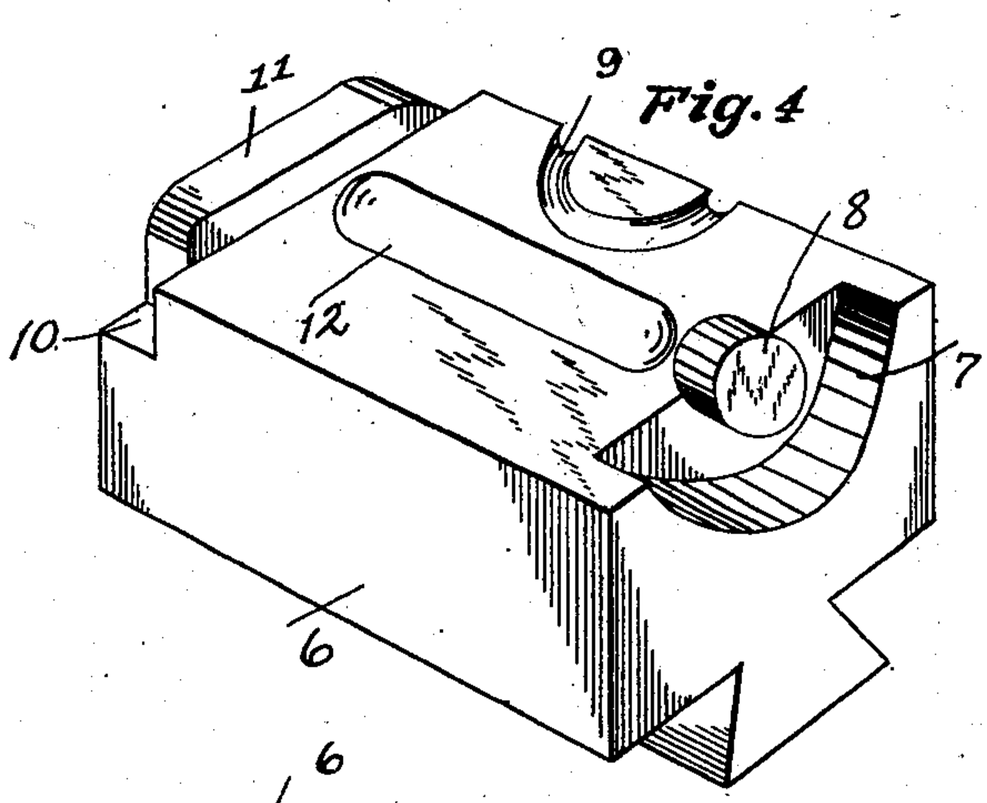
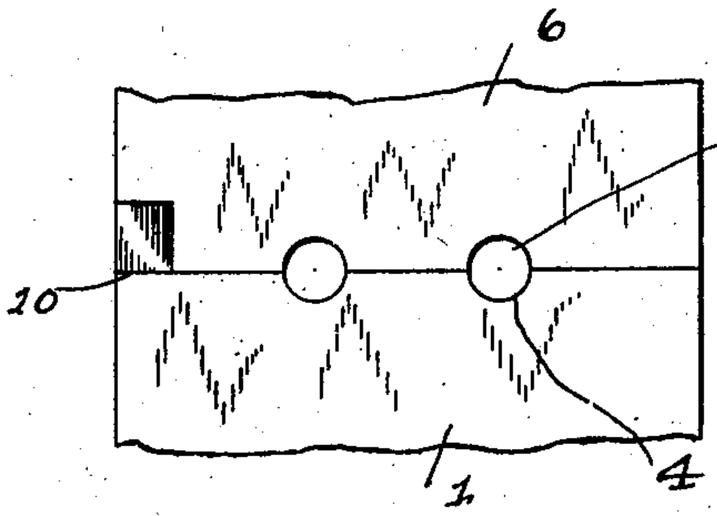


Fig. 5



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No. 746,287. Patented December 8, 1903.

UNITED STATES PATENT OFFICE.

DANIEL CARROLL, OF COLUMBUS, OHIO, ASSIGNOR TO COLUMBUS CHAIN COMPANY, OF COLUMBUS, OHIO, A CORPORATION OF DELAWARE.

METHOD OF MAKING CHAIN-LINKS.

SPECIFICATION forming part of Letters Patent No. 746,287, dated December 8, 1903.

Application filed December 7, 1901. Serial No. 85,009. (No model.)

To all whom it may concern:

Be it known that I, DANIEL CARROLL, a citizen of the United States, residing at Columbus, in the county of Franklin and State of Ohio, have invented a certain new and useful Improvement in Methods of Making Chain-Links, of which the following is a specification.

This invention relates to the art of making chain-links, and has for its object to provide improvements in the method or process whereby the link is formed from a straight link-bar.

A very important object of the invention is to carry out the method or process in such a manner as to readily permit detection of imperfections in the completed link as soon as finished. It is furthermore designed to arrange the steps of the method or process in a new and novel manner, whereby the converting of a straight bar into a complete elongated chain-link is carried out in a simple and improved manner.

The dies employed in my improved process are indicated in the drawings, in which—

Figure 1 is a view in perspective of the lower or base die. Fig. 2 is an end view of the dies, showing the link-bar or rod-section between the same. Fig. 3 is a view in elevation showing two chain-links connected with a partially-completed link. Fig. 4 is a perspective view of the upper die-block, showing the same inverted; and Fig. 5 is a front view showing portions of the upper and lower dies when the same are in contact.

In the description of the dies similar numerals refer to similar parts throughout the several views.

My improved process of producing the elongated chain-links illustrated in Fig. 3 of the drawings is substantially as follows: A section of chain-link rod of proper length being heated has first imparted to its end portions corresponding inward bends, after which the same is bent to a circular or ring form, such as is indicated in Fig. 3 of the drawings. This being accomplished, the ring is subjected to the proper heat and its overlapping end portions welded together. The completed ring is then pressed into the oblong or elongated form shown in Fig. 3, the central stay, if one is used, clamped between the parallel longer arms of the link in the usual manner.

In producing this operation I preferably employ the dies which are illustrated in the drawings and which are constructed and used as follows: Of these dies 1 is the lower or base die, in the upper surface and inner end of which is formed a semicircular depression 2 and in the opposite end and upper side of which is formed a transverse depression 3, having rounded or upwardly-curved ends 3^a, as shown more clearly in Fig. 2 of the drawings. I also form in the upper side of the lower die-block 1 a semicircular depression 4, the ends of which lead through the outer or forward side of the block. 5 represents an elongated depression or socket which is formed longitudinally in the upper side of the block, each end of the same being formed with a rounded incline.

In constructing the upper die section or block, which is indicated at 6, the same is provided at one end and on its under side with a depression 7, into which projects from the body of the block the upper portion of a horizontal die-pin 8, the lower portion of which projects below the bottom of said die 6. This upper die-block also has formed on its under side a partial circular recess 9, which is adapted to register with the recess 4 of the lower die when the dies are brought together. That end of the lower die-block 6 which is opposite the end having the pin 8 is provided with an offset 10, from which extends downwardly a die lug or projection 11, the lower side of which is horizontal and the ends of which are rounded, as indicated. The upper die-block is also provided longitudinally with an elongated depression 12, corresponding with the depression 5 of the block 1.

In utilizing the dies for the purpose described a section of chain-link rod, such as is indicated at 13 in Fig. 2, is, as shown in said figure, so supported on the die-section 1 that when the upper die-section 6 descends the die projection 11 thereof will press the link-body into the recess 3, resulting in the upturning of the ends of said link-body, as shown. This being accomplished, the link-body is so arranged over the recess 2 of the lower die that the descent of the upper die must cause its depression into the recess 2 of the lower die, and through the clamping of the link-body within said recesses 7 and 2

and about the pin 8 an incomplete ring form is imparted, such as is indicated in Fig. 3. A complete ring form is now imparted by a blow of a hammer or other suitable means, thus causing the beveled ends of the link-body to overlap in position for welding. The purpose of initially bending the terminals of the bar will now be understood from the fact that if the ends were not so bent they would not register properly for welding, as the bending pressure to shape the bar into circular form is applied intermediate of the ends of the bar, and therefore said end portions would lie in substantial parallelism instead of being turned inwardly toward one another. This initial bending of the terminals of the bar is therefore a very important feature of advantage, as it makes it possible to form the link solely by the action of dies and obviates the necessity of employing means independent of the dies connected to the ends of the bar to bend the same into substantially circular shape. The ring thus formed being again subjected to the proper heat has that portion thereof which embodies the overlapping ends placed in the lower die-groove 4, the descent of the upper die resulting in a proper welding of the ends of the link. The complete ring thus being produced it is supported in an upright position within the recess 5 of the lower die and on descent of the upper die is pressed to the elongated form indicated in Fig. 3.

In placing the circular link between the dies to give it an elongated shape it is preferred to have the welded portion either at the top or the bottom of the link in order that the pressure may be applied to the link in a direction passing through the weld and the center of the link, whereby the weld may lie substantially midway between the ends of the completed elongated link, as this disposition of the weld renders the link stronger and more durable than if it were located at one end of the elongated link for the reason that when the weld is at one side of the link the strain is longitudinal of the joint, but when it is at an end of the link the strain is transversely across the joint. Furthermore, in bending the circular link into an elongated link if the weld were located at one end of the completed link the bending of the latter close to opposite sides of the weld at a comparatively sharp curve would tend to distort, and thereby weaken, the joint, whereas by having the weld located in the comparatively straight portion of the link between its ends there is no distortion of the welded joint, and hence no weakening thereof.

It has been customary in the production of links of the character herein shown to bend the link-body to the elongated form before connecting the link in the chain for welding, and the machines or devices which have ordinarily been used for producing this bend have resulted in the production of a slight twist of the link-body, which undesirable result is by my improved process obviated, inasmuch as the welding is accomplished after the link-body has been bent into a circular form and before the comparatively short bends for the elongation of the link are produced. It will also be observed that by my improved process the defective welding, such as results by reason of slag or other impurities in the material preventing the proper uniting of the scarfed ends of the link, will be disclosed when the link is pressed into the oblong form through the separation or partial separation of the welded ends, whereas by the ordinary process of welding the ends of the link after it is bent to its final shape a defect in the welding is not disclosed until the chain is tested or put into use.

From the foregoing description it will be understood that the order of the steps of the present method is an essential feature thereof for the following reasons: By initially forming slight terminal bends or kinks in the link-bar said bent ends come into proper mutual relation for welding after the link-bar has been bent into a substantially circular loop without producing any twisting of the link, whereby the product is an untwisted flat link, which is a great desideratum in this art. Furthermore, it is important that the link-bar should be first formed into a substantially circular loop and then pressed into an elongated or elliptical shape, as the pressure required is very great and is a test of the strength and durability of the weld which connects the ends of the link-bar. Hence the final step of the method not only gives the product its completed shape, but is also a test of the strength of a welded joint.

While I am aware that struts or cross-bars have been fitted within links by compressing the sides of the latter against the ends of the cross-bars, such cross-bars have been invariably applied to elliptical or elongated links and the pressure required has been comparatively slight and in any event not sufficient to materially alter the shape of the link and serve in the capacity of a test of the weld. I am also aware that the shape of elongated or elliptical links has been slightly changed by pressure; but the pressure has been applied to the link in its elongated shape and has not been sufficient to act as a test of the strength of the weld.

In addition to the actual formation of the link my invention also includes in the essential steps of forming the link a test of the strength of its weld, and thereby obviates the necessity for testing a completed chain.

It will be observed that through the medium of the dies herein described a chain-link may be produced in a completed form without the employment of additional bending mechanism—that is to say, the present method is carried out solely through the medium of dies and the successive steps are performed by

one and the same set of dies, thereby greatly simplifying the operation and producing a very strong and durable article.

Having now fully described my invention, what I claim, and desire to secure by Letters Patent, is—

1. The herein-described method of making chain-links, consisting in first bending a link-bar into substantially circular form, then welding the ends of the bar without affecting the shape of the loop, and finally subjecting the substantially circular loop to pressure sufficient to give the loop an elongated shape and to test the efficiency of the weld.

2. The herein-described method of making chain-links, consisting in bending a link-bar into a substantially circular loop, welding the ends of the bar without affecting the shape of the loop, and applying pressure externally at the weld and at a point diametrically opposite the weld to give the link an elongated shape with the weld disposed intermediately of the opposite ends of the link and to test the efficiency of the weld.

DANIEL CARROLL.

In presence of—
C. C. SHEPHERD,
A. L. PHELPS.