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PROCESS OF MANUFACTURING STEEL CONVEYER CHAINS

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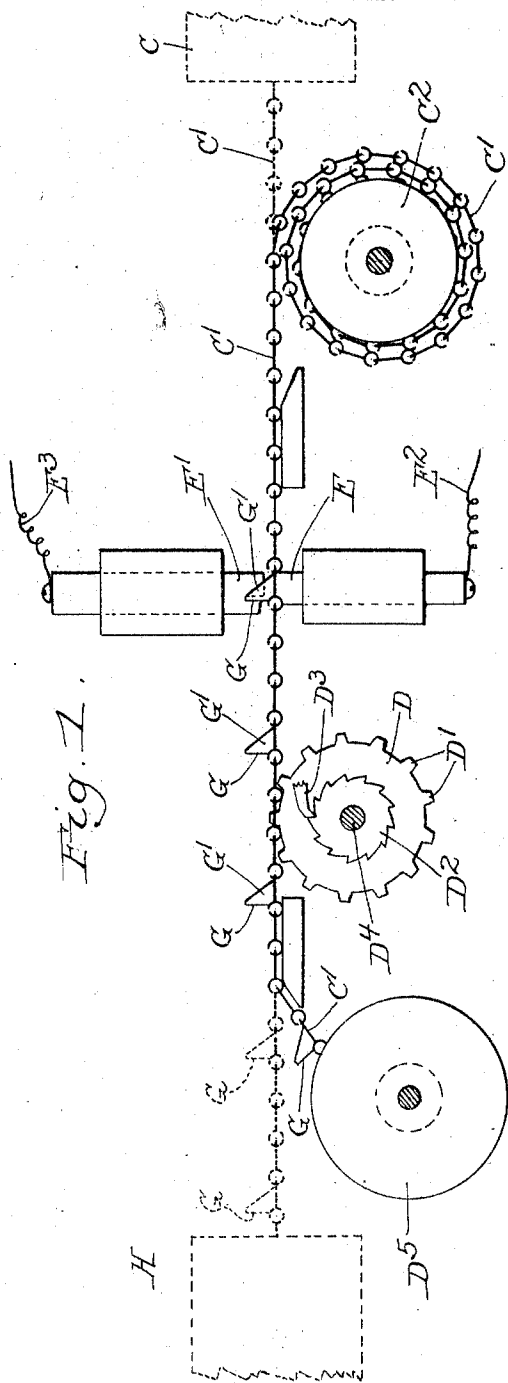


Fig. 1.

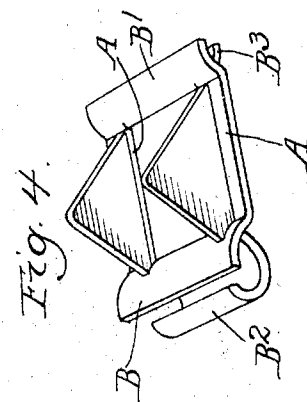


Fig. 4.

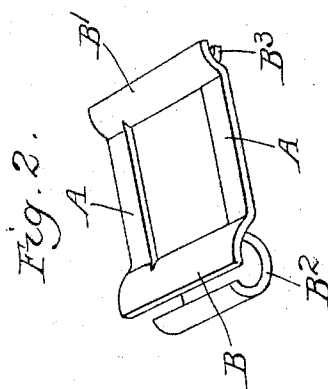


Fig. 2.

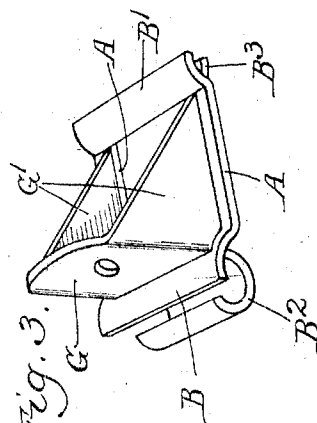


Fig. 3.

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UNITED STATES PATENT OFFICE.

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PROCESS OF MANUFACTURING STEEL CONVEYER CHAINS.

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Our invention relates to a process of chain manufacture and to the chain produced thereby. It is applicable particularly to that type of chain wherein the individual links are formed of strip stock or from rectangular blanks, each link being provided with a hook and pintle in part stamped out of the central aperture of the link, the hook of each link surrounding the pintle of an adjacent link. In manufacturing chain of this type, it is prevailingly necessary to heat-treat or temper the chain after the links have been stamped out and joined to each other. We provide a method for securing special attachments to links or for forming chain having spaced links therein differentiated from the adjacent links, in which the special links are easily and cheaply formed. Other objects will appear from time to time in the course of the specification and claims.

We illustrate our invention more or less diagrammatically in the accompanying drawings, wherein—

Figure 1 is a diagrammatic view of the carrying out of the process;

Figure 2 is a typical link;

Figures 3 and 4 are links having secured thereto special attachments in accordance with our process.

Like parts are illustrated by like characters throughout the specification and drawings.

The chain formed by or treated in the course of our process is preferably but not necessarily a chain composed of links of the type of Figure 2. Each link of that type consists of side bars A, the hook end bar B, the pintle end bar B¹ and the hook and pintle tongues B², B³ respectively, which are punched out of the center of the link and formed into substantially the form shown in Figure 2. The hook of one link surrounds the pintle of the adjacent link. Chain of this type may, if desired, be continuously formed, with the hook of one link positioned about the pintle of the next, and may be fed directly, and continuously forward from the chain press for the further steps below described.

We illustrate diagrammatically in Figure 1 a chain forming press C wherein is continuously formed a chain C¹ consisting of an assemblage of links such as are shown

in Figure 2. C² is a storage reel upon which such chain may be wound and stored. Our process may, under some conditions, be carried on with chain fed directly from the chain forming press, but we prefer to feed the chain from the storage reel or from any other suitable storage zone or member.

The chain, whether fed from a storage zone or from a chain forming press, is fed forward, preferably by a step by step movement. We illustrate herein a sprocket D with the teeth D¹ adapted to penetrate the central apertures of the individual links, a ratchet wheel D², a dog D³ and a drive shaft D⁴ actuated from any suitable power source not herein shown. The sprocket is employed to draw the chain forward from its point of delivery from the chain forming press or from the storage zone or member in a step by step movement, properly timed and adjusted for the particular type and size of chain produced. The sprocket D may, if desired, be associated with a storage drum D⁵, or any other suitable storage element may be provided, or the storage drum may be substituted for the sprocket.

In the course of its movement the chain passes between the upper and lower electric welding contacts or clamps E, E¹, provided with the electrical connections E², E³, and preferably of copper. In the particular mechanism herein shown the element E is stationary and the clamp E¹ is vertically movable in response to any suitable actuating means not herein shown, the details of which are not herein claimed. The particular element, which is to be secured to the links of the chain is positioned, by hand or in any other satisfactory manner, over or under the link to which it is to be secured, and beneath the clamp E¹. The clamp E¹ is actuated to force it against the link, the bottom of the link being supported by the element E. Current is then passed through the clamp elements E, E¹, and the rough contact between the link and the member being welded to it provides the resistance necessary for the welding operation. At the conclusion of the welding operation the current is broken and the clamp E¹ is withdrawn, and the chain is moved forward until the link next to be treated is positioned beneath the clamp. The movement of the sprocket D may be

made responsive to or may be timed in relation to the movement of the clamp, or the flow of the current. The drive of the sprocket may be adjusted to vary the interval of the links being treated. For example, all the links may be treated, or the treated links may be spaced apart by any desired number or interval of untreated links.

We illustrate herein in Figures 3 and 4 treated links illustrating the type of element which may be secured to the links. The additional element may be secured to any part of the link, but we illustrate a preferred location of the actual joining of the metal, the special part being welded along the side bars of the link. The side bar is that part of the link which is least likely to be distorted by the pressure of the clamp E^1 and the electrowelding operation, being supported along its entire length by the element E. In Figure 3 we illustrate an upwardly projecting lug G which passes across the top of the hook of the link and is secured to the link by the rearwardly projecting ears or supports G^1 , the bottoms of which are welded along the side bars. The lug G need not necessarily be welded to the link hook, the securing of the supporting ears G^1 along the side bars being generally sufficient. In Figure 4 we illustrate a form of link in which upwardly projecting triangular ears are welded to the side bars, but are unconnected with each other.

We illustrate diagrammatically in dotted lines, a furnace H, in which the chain is heat treated in any suitable manner, the specific details of the treatment forming no part of the present invention, as claimed herein.

It will be understood that the description and drawings herein are to be taken as diagrammatic and illustrative, rather than as limiting us to any specific sequence of steps or mechanisms for carrying them out, and many changes may be made in the details of our process without departing from the spirit of our invention.

The use and operation of our invention are as follows:

In the use of chain of the type herein described and shown, it frequently is necessary to employ links having projections upwardly or outwardly therefrom, or both for conveying or other purposes. Sometimes all of the links must be so provided, and sometimes only occasional links spaced along the chain. By our process we manufacture continuous chain of the type described by feeding strip stock through a chain press, the details of the press and the dies and punches therein employed forming no part of the present invention. Completed chain of the described type is fed forwardly from the press either directly to the welding zone, or to an intermediate storage zone. In order to modify the links, or certain of them,

we pass the chain between opposed clamping elements, which may serve the double function of positioning the supplemental element upon the link to which it is to be secured, and of acting as contacts for the electrowelding operation.

The chain may be passed automatically by a step by step movement between the opposed clamping contacts, the elements to be welded to the links being positioned above or below the links.

We preferably perform the welding operation upon untempered chain, since the heat of the welding affects the temper or hardness of the chain. We then pass the welded chain to and through a heat treating furnace where the entire chain is hardened and toughened by any suitable heat treatment, the details of which form no part of the present invention.

We may carry on our process continuously in association with the formation of chain, or we may treat the chain only after an intermediate period during which the chain has been stored, for example upon a roll or reel.

We may feed the welded chain directly to the heat treating furnace, or we may hold it in an intermediate storage zone, and feed it thence continuously, or in separate lengths to the furnace.

Obviously the objects to be welded to the links can be welded upon any part of the link, but we prefer in general to weld them to the side bars, since the side bars are plane and unextended and are completely supported by the die, as shown in Figure 1, thus minimizing the possible distortion of the link during the welding operation.

We claim—

1. The process of manufacturing chain, which consists in stamping from strip stock links each having a hook at one end surrounding the pintle of the adjacent link, electro-welding to the links of said chain, after its formation, elements projecting from said links, and subsequently hardening the welded links by heat treatment.

2. The process of manufacturing chain, which consists in stamping from strip stock links, each having a hook at one end surrounding the pintle of the adjacent link, and flat side bars connecting the hook and pintle of each link, electro-welding to the links of said chain, after its formation, elements projecting from and secured to said flat side bars, and subsequently hardening the welded links by heat treatment.

3. The process of manufacturing chain, which consists in passing strip stock through a press, forming therefrom links, each having a hook at one end surrounding the pintle of the adjacent link, feeding said chain forwardly from said press, passing it by a step by step movement through an electric welding zone, positioning adjacent said links the

members to be welded thereto, holding each such member against the link to which it is to be welded, while the chain is at rest, passing an electric current through the opposed link and member to weld them, moving the chain forwardly intermediate such welding operations, and passing the chain with the welded links through a heat treating zone and hardening said chain therein.

4. The process of chain formation which consists in forming a chain comprising a plurality of links, each link consisting of relatively flat side bars joined at one end by a pintle and at the other end by a hook, passing such chain through an electric welding zone, positioning upon the links thereof the members to be welded thereto, and holding them together by means of opposed welding contacts, passing an electric current through the opposed welding contacts and the link and the member, and subsequently passing said chain into a heat treating zone.

5. The process of manufacturing chain which consists in forming a chain comprising a plurality of links, each link consisting of relatively flat side bars joined at one end by a pintle and at the other end by a hook, electro-welding supplemental elements upon

links in said chain, and subsequently heat treating the chain.

6. The process of manufacturing chain, which consists in forming the links, passing the formed chain through an electro-welding zone, welding to said links supplemental elements projecting therefrom and subsequently hardening the chain, including the welded links, by heat treatment.

7. The process of manufacturing chain, which consists in forming the links, feeding the formed chain forwardly by a step by step movement through an electro-welding zone, positioning adjacent said links members to be secured thereto, holding each such member in contact with the link to which it is to be welded, while the chain is at rest, passing an electric current through the opposed link and member, to weld them, moving the chain forwardly intermediate such welding operations, and subsequently passing the chain with the welded links, through a heat treating zone, and hardening the chain therein.

Signed at Indianapolis, Indiana, this 18th day of October 1924.

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