Dec. 22, 1931. R. E. WALDRON 1,838,025

METHOD OF MAKING CHAIN LINKS

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Fig. 1

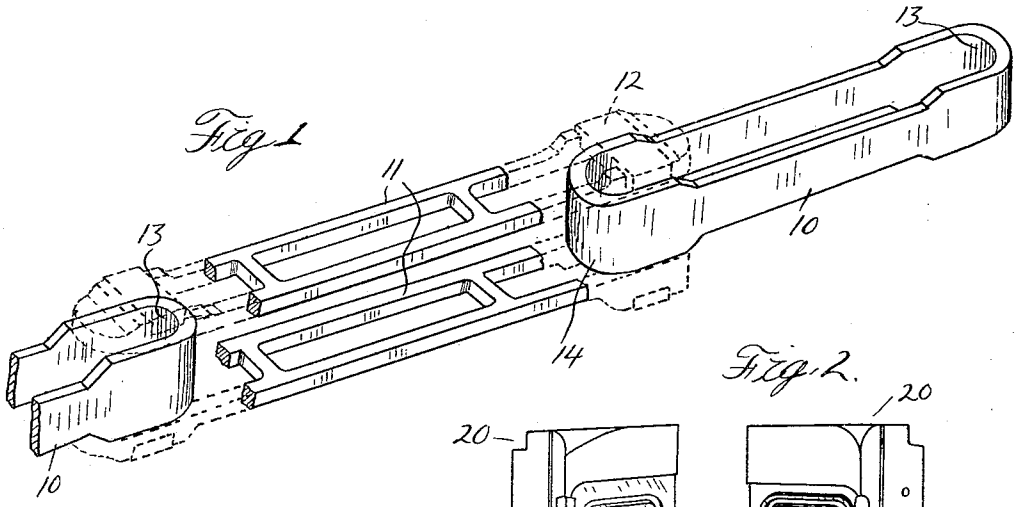


Fig. 2.

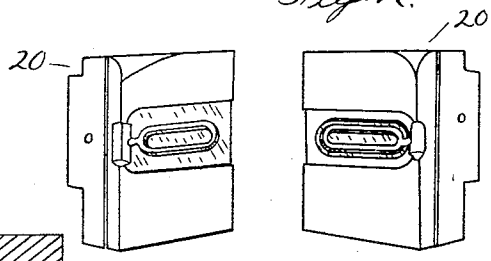


Fig. 3.

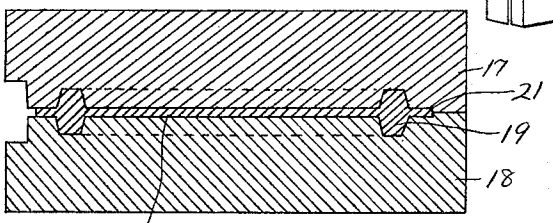


Fig. 5.

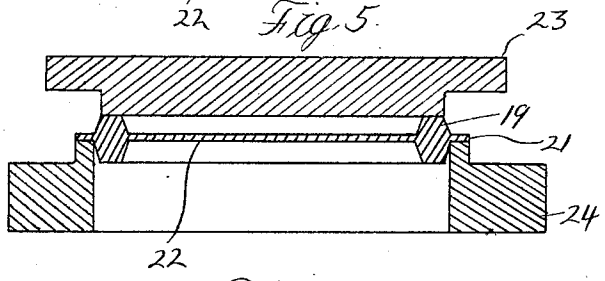


Fig. 8.

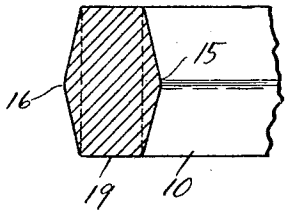
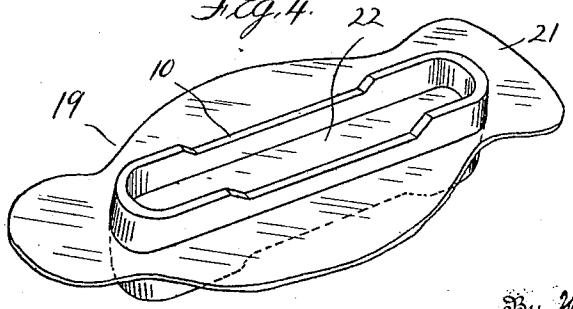


Fig. 4.



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Fig. 6

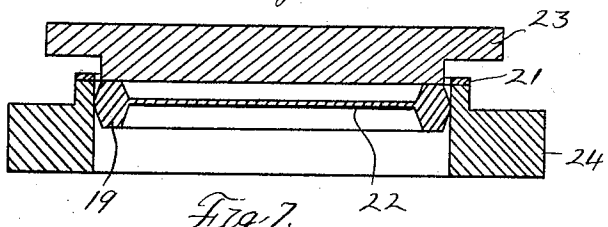


Fig. 7.

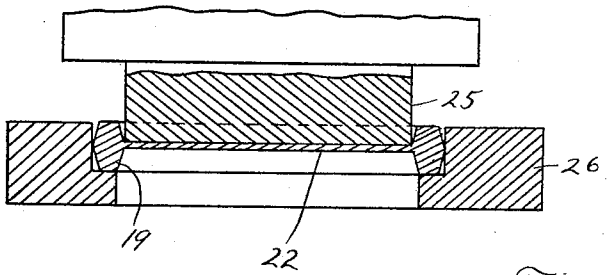
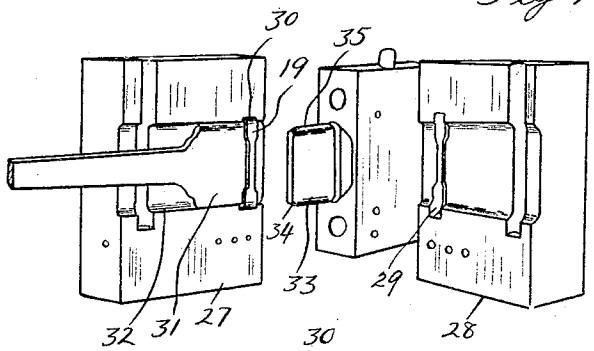


Fig. 9.



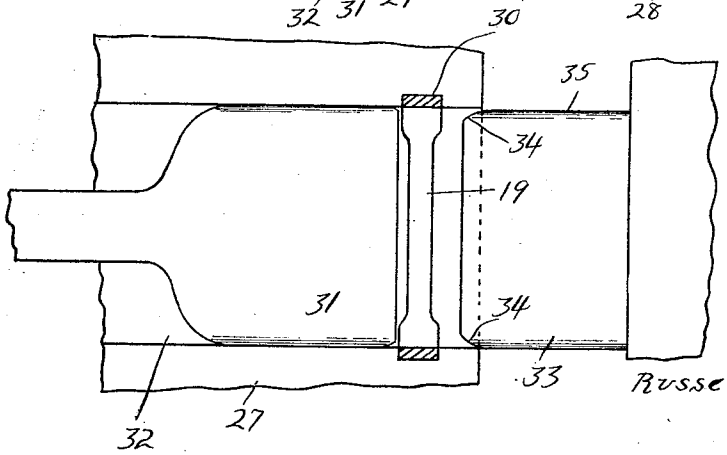


Fig. 10

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UNITED STATES PATENT OFFICE

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METHOD OF MAKING CHAIN LINKS

Application filed December 22, 1924. Serial No. 757,505.

This invention relates to chain links and particularly to a method of producing the same.

The invention contemplates the production of chain links provided with parallel surfaces by a die forging method whereby links for instance of relatively large dimensions designed for use in conveyor chains and the like may be cheaply and quickly manufactured.

The various objects and advantages of this invention will be made more apparent as the description proceeds especially when considered in connection with the accompanying drawings wherein:

Figure 1 is a fragmentary perspective view of a chain showing a link constructed in accordance with the invention;

Figure 2 is a separated perspective view of the original forging dies;

Figure 3 is a sectional view through the original forging dies with the work piece in position;

Figure 4 is a perspective of the work piece after it leaves the original forging dies;

Figure 5 is a sectional view through the punching die employed for trimming the flash or excess material from the work piece;

Figure 6 is a similar view showing the die parts and work piece after the trimming operation;

Figure 7 is a sectional view through the punching die employed for removing the web from the center of the link;

Figure 8 is an enlarged sectional view showing the transverse shape of the link after it leaves the punching press shown in Figure 7;

Figure 9 is a separated perspective view of the clamping die and stretching punch employed for surfacing the ends of the link to produce parallel surfaces; and

Figure 10 is a sectional view showing the parts illustrated in Figure 9 after the operation upon the link.

Referring now particularly to the drawings wherein like characters indicate like parts, it will be noted that there is illustrated in Figure 1 a section of a conveyor chain comprising link members 10 which are alternately arranged with link members formed by a pair of members 11, pivotal connection between the members 10 and 11 being provided by pivot pins 12 disengageably connected to the members 11. In practice the surface 13 at each end of the link member 10 has a bearing engagement with the pin 12 of each link while the exterior end surfaces 14 of each link member 10 are engageable by the teeth of the sprocket wheel (not shown).

Heretofore the practice has been in general to forge or cast the link members 10 with substantially centrally arranged longitudinally extending inner and outer draft or bevel portions 15 and 16 respectively. In order to remove these raised portions and produce a suitable bearing surface on the inner ends 13 of the links the latter were usually machined at this point, while in many instances no consideration was given to the outer end surface 14 that engaged the teeth of the sprocket wheel.

The result of this practice was that the cost of production of the links 10 was materially increased as well as the time required for manufacture. Furthermore, the constant engagement of the bevels or drafts 16 with the teeth of the sprocket wheel proved costly in that this action occasioned unusual wear to the teeth.

An important object of this invention is therefore to produce chain links substantially similar to the links 10 by a die forging method. Another object is to provide means, during the production of the links for redistributing the metal at the ends of the link and for so shaping these ends as to produce parallel interior and exterior surfaces affording satisfactory bearing surfaces for the pins 12 and for the teeth of the sprocket wheel.

In practicing this invention a forging die similar to that illustrated in Figures 2 and 3 is preferably employed comprising upper and lower die members 17 and 18 between which the blank is inserted to form a work piece 19 such as shown in Figure 4. In actual practice the blank is in the form of a bar, the end of which is inserted between the die

members 17 and 18 and after the formation of the work piece 19 it is sheared off from the remainder of the blank, on the next operation of the die members, by means of the shearing members 20 carried respectively by the die members 17 and 18.

The work piece as it comes from the original forging dies comprises in addition to the main link body a circumferential flange 21 of excess material or flashing as well as a central web or slug 22.

In Figures 5 and 6 there is illustrated a punching die comprising upper and lower die members 23 and 24 by means of which the flashing 21 is sheared off or removed from the outside of the work piece. As will be noted from an examination of Figures 5 and 6, the work piece 19 is placed upon the die member 24 and is punched through this die member by the upper die member 23 and the flashing or excess material 21 is trimmed therefrom.

In Figure 7 there is illustrated a punching die comprising upper and lower die members 25 and 26 by means of which the web or slug in the center of the work piece is removed. In carrying out this operation the work piece 19 is supported upon the lower die member while the central web thereof is engaged by the upper die member and removed from the work piece by a punching operation.

The exterior conformation of the work piece or link at this stage is illustrated in Figure 8. The draft or bevel on the outer and inner sides of the link is shown, somewhat exaggerated, for the purpose of emphasizing the importance of the next step of this method by which these vertical sides of the link, particularly at the ends thereof, are flattened or straightened, by a redistribution of the metal, to form inner and outer bearing surfaces for the purpose hereinbefore mentioned.

In Figures 9 and 10 the means for carrying out the last step of this method is illustrated. For this purpose there is preferably provided a clamping die composed of die members 27 and 28 into which the work piece or link 19 is adapted to be placed, in the manner clearly shown. The work piece or link rests in a recess formed by the slots 29 of the two die clamping members, the ends 30 of this recess being squared with reference to the longitudinal axis of the recess whereby the ends of the link 19 when forced into engagement therewith will consequently be squared or flattened with reference to the longitudinal axis of the link.

To afford means for handling the work piece 19 and for protecting the same against the clamping action of the die clamping members 27 and 28 there is provided a combined handling tool and filler block 31 which may rest within a longitudinal depression 32 formed in the die members and be longitudinally displaceable therein. At the beginning of this last stage of the method this filler block 31 extends within and preferably through the work piece or link 19 as shown in Figure 9. The sides of the link are therefore prevented from collapsing so that no difficulty will be experienced in forcing the stretching punch 33 into and through the hole of the link. As the stretching punch 33 approaches the work piece it first engages the filler block 31 and moves the same longitudinally from engagement with the work piece as will be obvious.

The stretching punch 33 is preferably provided with a tapering forward end 34 to facilitate the entrance of the punch into the hole of the link, the longitudinal edges 35 of this punch being parallel. The vertical dimension of this punch, as seen in Figure 9, is such as to cause a stretching or expansion of the work piece 19 within the recess 29 of the clamping die.

It will be understood that the stretching punch acts principally upon the ends of the work piece, the engagement of this punch with the inner end surfaces 13 causing a flattening or redistribution of the metal and a forcing of the excess material outwardly with the result that the outer end surfaces 14 are pressed up against the squared ends 30 of the work piece recess. Consequently the inner and outer surfaces of the link, at the ends thereof, are rendered substantially parallel to one another to form suitable bearing surfaces.

By practicing the herein described method chain links and the like may be formed by die forging and provided with suitable bearing surfaces without necessitating a machining operation whereby the cost and time of production is reduced to a minimum. While the method has been described as including several distinct steps it will be immediately obvious to those skilled in the art, that one or more of the several operations may be combined by properly constructing the die members and to this end the invention contemplates such modifications in the manner of executing the same as may come within the purview of the accompanying claims.

What I claim as my invention is:

1. The method of producing forged chain links having their ends provided with parallel interior and exterior surfaces which consists of die forging the link from a blank, removing the excess material by die punching and removing the draft or bevel from the ends of the link by clamping the link in a clamping die with the die embracing the ends of the link and forcing a stretching punch into the hole of the link.

2. The method of producing forged chain links having their ends provided with parallel interior and exterior surfaces which consists of die forging the link from a blank,

removing the excess material from the exterior and interior of the link and removing the bevel from the link at predetermined points by clamping the link in a clamping die with the die embracing the ends of the link and forcing a punch into the hole of the link.

3. The method of producing forged chain links provided with parallel surfaces which consists of die forging the link from a blank, removing the excess material from the exterior and interior of the link and removing the draft or bevel from the ends of the link by clamping the link, mounted on a filler block, in a clamping die and subjecting the link to the action of a stretching punch which displaces the filler block and enters the hole of the link.

In testimony whereof I affix my signature.

RUSSELL E. WALDRON.