

(No Model.)

W. A. McCool.

DIE FOR MAKING LINKS FOR SPROCKET CHAINS.

No. 461,268.

Patented Oct. 13, 1891.

Fig. 1.

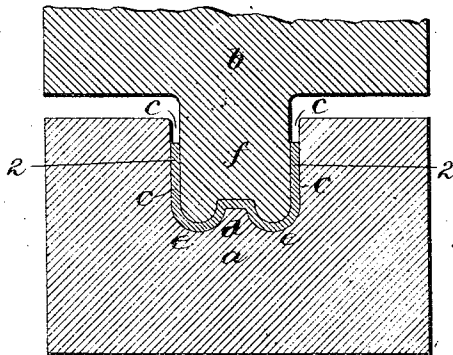


Fig. 2.

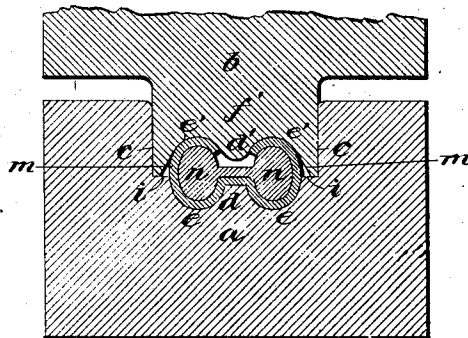


Fig. 4.

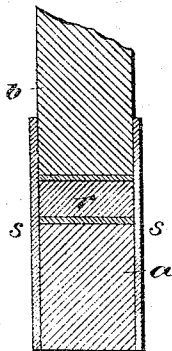


Fig. 3.

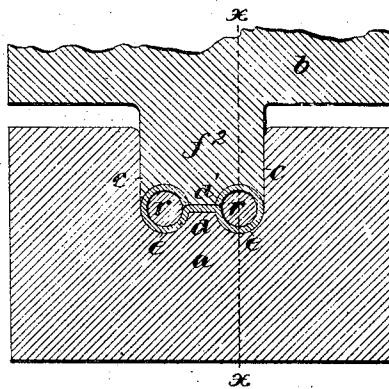


Fig. 5.

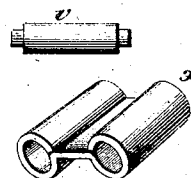
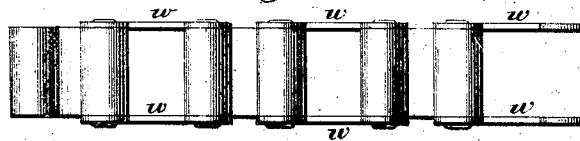


Fig. 6.



Witnesses

Howell Gault.
G. M. Copecharer.

Inventor

William Allen McCool
By his Attorneys
Johnson & Johnson

UNITED STATES PATENT OFFICE.

WILLIAM ALLEN MCCOOL, OF BEAVER FALLS, PENNSYLVANIA.

DIE FOR MAKING LINKS FOR SPROCKET-CHAINS.

SPECIFICATION forming part of Letters Patent No. 461,268, dated October 13, 1891.

Application filed May 23, 1891. Serial No. 393,866. (No model.)

To all whom it may concern:

Be it known that I, WILLIAM ALLEN MCCOOL, of Beaver Falls, in the county of Beaver and State of Pennsylvania, have invented certain new and useful Improvements in Dies for Making Links for Sprocket-Chains; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

My invention relates to the manufacture of sprocket-chains for driving sprocket wheels or pulleys; and my improvement is directed to the production of the intermediate or pin-bearing links of such chain from a strip of steel quickly, easily, accurately, uniformly, and cheaply, and to form a wearing-surface in contact at every point with the pin, whereby the chain is rendered more durable, its pin-bearings in true lines, and its cost of manufacture greatly reduced. Heretofore in chains of this construction the mode of manufacture has been as follows: The intermediate or pin-bearing links have been made of cast malleable iron, and, after cleaning, the two parallel sides have been milled or ground off to a gang, the blank links then been placed in a jig, and the holes drilled for the pins. Wrought-iron or steel bars have also been rolled or drawn, having the desired form for the links, and the bar sawed off in lengths for the links and the holes for the pins drilled. Such chains have also been made with the intermediate or pin-bearing links of straps having their ends riveted or interlocked. It is essential to good results that the holes for the pins shall in every case be of exactly the same distance from center to center, that they shall be exactly parallel through the link, and that they shall be at exact right angles with its outer parallel sides; and it is for the manufacture of such chain-link parts to obtain these results that I have devised the dies and the mode of using them to produce the intermediate or pin-bearing links, as illustrated in the accompanying drawings.

Referring to these drawings, Figure 1 represents the dies in section as they appear in the first step in the operation of forming the link. Fig. 2 shows in section dies adapted for use with a bit, over which the ends of the

strap are partially closed in the second step in the operation of forming the link. Fig. 3 shows in section dies adapted for use with pins in the operation of closing the ends of the link to complete the holes for the bearing-pins of the chain. Fig. 4 shows a vertical section taken on the line *x* of Fig. 3. Fig. 5 shows the intermediate bearing-link and the pin therefor, and Fig. 6 shows in top view and in section a portion of the chain.

The dies are constructed of three separate and distinct pairs, each pair adapted for a distinct step in the operation of forming the bearing-link part, and each pair varying in construction according to the result obtained by each step of the operation.

Each step of the operation is performed by a pair of dies comprising an intaglio-die *a* 70 and a relief-die *b*, and the production of the article is commenced in one pair of dies and finished in the other pairs.

Referring to the initial dies in Fig. 1, the intaglio-die has a deep recess *c* made in its upper surface, having a width just equal to the length of the finished link, its walls vertical, and its bottom formed with a middle flat ridge *d*, standing parallel with the walls, and with concave grooves *e e*, which correspond to the bearing ends of the link. The relief-die is formed with a tongue *f*, having vertical sides, and a bottom the counterpart of that of the intaglio-recess, and it has a width to allow it to enter the intaglio-recess and press and form the strip of steel therein, with its ends standing up between the recess-walls and the tongue-walls.

Referring to the intermediate dies in Fig. 2, the recess in the intaglio-die is made of a width sufficient to form a flat bottom part *i i*, joining the vertical walls, and the curved bottom on a level above that of the flat ridge *d*, while the tongue *f'* of this relief-die has its bottom formed with a ridge *d'* and concave grooves *e' e'*, like the bottom of the recess in the intaglio-die, with the grooves terminating in outwardly and downwardly inclined walls *m*, standing out beyond and over the vertical ends of the strip, formed as in Fig. 1, to press and form these ends *2 2*, so as to partially close them over a bit *n*, which is the counterpart on both its sides of the upper or inner side of the strip as formed in the ini-

tial dies. The strip taken from the initial dies and the bit placed therein are together placed in the intermediate intaglio-dies, so that the relief-die inclined walls m will strike the straight ends 2 2 of the link-blank and form them over the upper side of the bit. From these dies the partially-formed link is removed, the bit taken out and replaced by pins r , one in each partially-closed end, which are of the exact diameter of the pins used in connecting the links of the chain, and this partially-formed link is placed in the finishing-dies shown in Fig. 3, wherein the intaglio-recess is the counterpart of that of the initial dies and the tongue f^2 of the relief-die is the counterpart of the tongue of the intermediate dies, except that the walls of the intaglio-recess and of the relief-die tongue are coincident with the outer ends of the finished link, the ends of which are closed over the pins, so as to abut upon the flat web part of the link, thus forming the holes of perfect circles, in perfect parallel relation and at right angles to the outer sides of the link, which are the important requirements of a sprocket-chain. In this finishing operation the flat faces of the ridges d d' of the intaglio-recess and of the relief-tongue are coincident and form the web or flat part of the link in the center line of its holes, so that the greatest strength shall be obtained in the line of the greatest strain on the link and the bearing shall be equal at all sides on the pins. The recess in the intaglio-die is preferably open at each end for convenience in placing and removing the link being formed.

As a means of preserving the parallelism of the link under the various operations, removable plates s may be provided to close one or both ends of the recess, as seen in Fig. 4.

I prefer to arrange the several pairs of dies in separate relation on a suitable bench; but it is obvious that a series of such dies may be arranged in a suitable revoluble head and operated continuously as a press.

The die-formed chain-link, produced as described and to obtain the advantages stated, is a new article of manufacture, so far as I know and can find.

w are the outer links, and v are the shouldered pins, of the chain in which the pins are riveted, and x is the intermediate or pin-bearing link. The three steps by which this link is formed render the operation continuous, in which its transfer is from one part of the machine to another part, whereby one-half of the link is first formed by the joint action of the dies themselves. The ends of the link are next partially closed by the joint action of dies and a bit, and the ends of the link finally closed, so as to be about square on the

web of the link by the joint action of the dies, and a pin placed within each of the partially-closed ends, thus producing the perfect link.

I claim as my improvement—

1. Dies for making links for sprocket-chains, comprising three separate and distinct pairs, one pair for the initial, one pair for the intermediate, and one pair for the finishing steps in the operation, each pair having an intaglio-die formed with a recess having vertical walls, a bottom middle flat ridge, and concave grooves on each side of the latter for forming one side of the finished link, a relief-die for the initial intaglio-die, having a tongue-face formed with convex ridges and a middle groove, the counterpart of the said initial intaglio-recess, a relief-die for the intermediate pair, having a tongue-face formed with concave grooves and a middle ridge the counterpart of the intaglio-recess, the grooves of said tongue terminating in downwardly and outwardly inclined walls, an independent bit, the counterpart of these last-named intaglio and relief faces, over which the other side of the link is partially formed, a relief-die for the finishing pair, having a tongue-face formed with a ridge and concave grooves the counterpart of the said intaglio-recess, and separate pins over which the link-holes are finished, substantially as described.

2. For making links for sprocket-chains, a pair of dies comprising an intaglio-die formed with a recess having vertical walls, a bottom flat ridge, and concave grooves on each side of the latter, a relief-die having a tongue-face formed with concave grooves and a middle ridge, the counterpart of the intaglio-recess, the grooves of said tongue terminating in downwardly and outwardly inclined walls, and an independent bit, the counterpart of said intaglio and relief faces, for partially forming the link, substantially as described.

3. For making links for sprocket-chains, a pair of dies comprising an intaglio-die formed with a recess having vertical walls, a bottom flat ridge, and concave grooves on each side of the latter, a relief-die having a tongue-face formed with concave grooves and a middle ridge, the counterpart of the intaglio-recess, and separate pins over which the link-holes are finished, substantially as described.

4. The die-formed chain-link herein described, having its pin-bearing holes of perfect circles and its web coincident with the centers of said holes, as shown and described.

In testimony whereof I have signed this specification in the presence of two subscribing witnesses.

WILLIAM ALLEN MCCOOL.

Witnesses:

AUG. T. BROOK,
ARTHUR WEISS.