(No Model.) 4 Sheets—Sheet 1.

O. KLATTE.

ROLLS FOR THE MANUFACTURE OF CHAINS.

No. 523,432. Patented July 24, 1894.

Fig. 1.

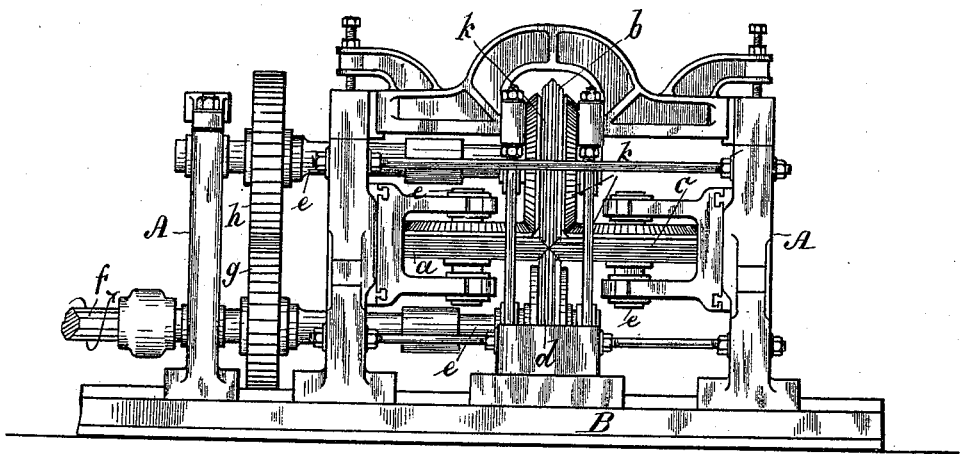
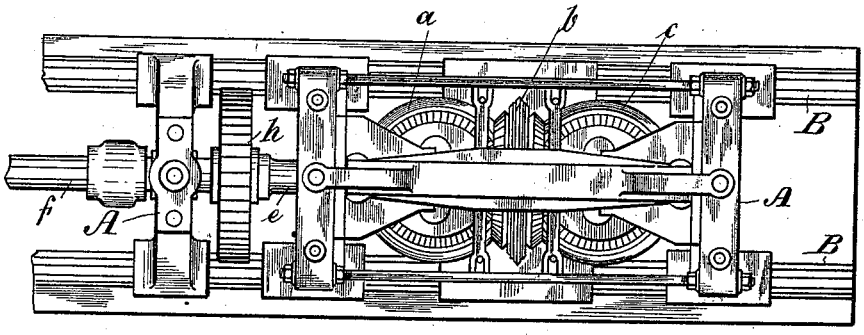


Fig. 2.



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Peter A. Ross

Inventor:
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by Henry Connett
his Attorney

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ROLLS FOR THE MANUFACTURE OF CHAINS.

No. 523,432. Patented July 24, 1894.

Fig. 3.

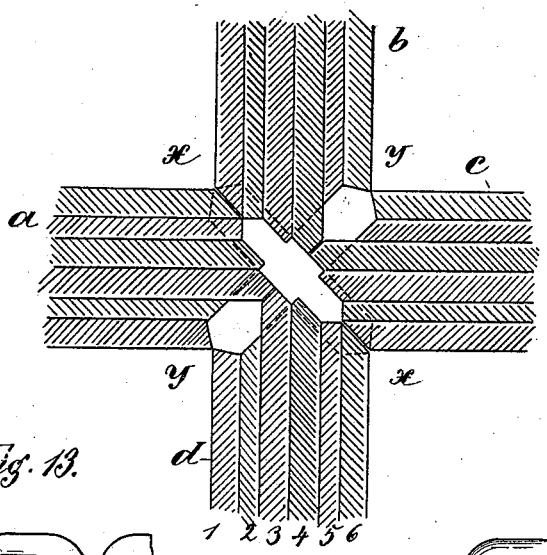

Fig. 14.

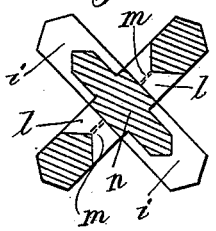

Fig. 13.

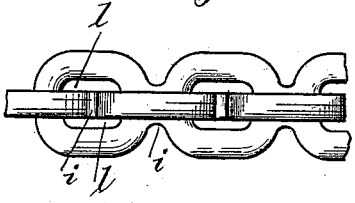

Fig. 15.

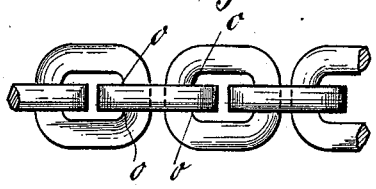

Fig. 4.

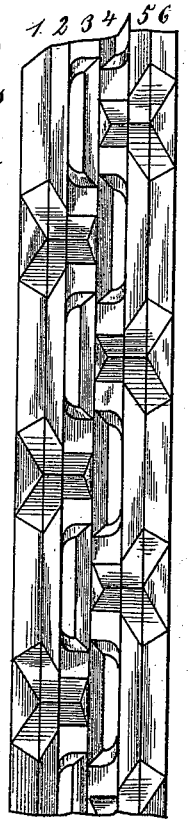

Fig. 17.

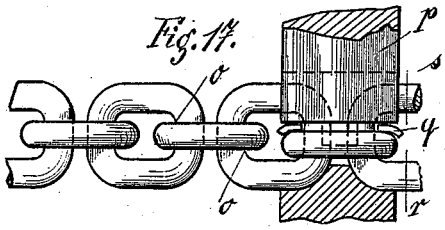

Fig. 19.

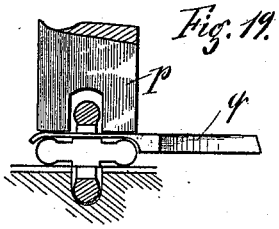

Fig. 18.

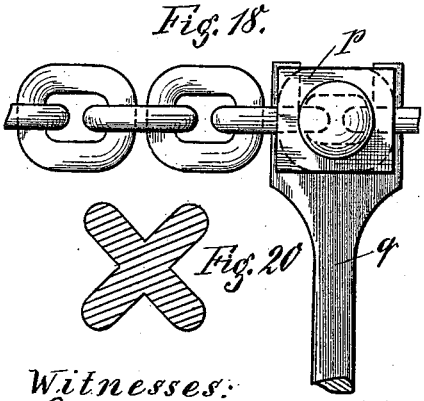

Fig. 16

Fig. 20

Fig. 21.

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Fig. 5.

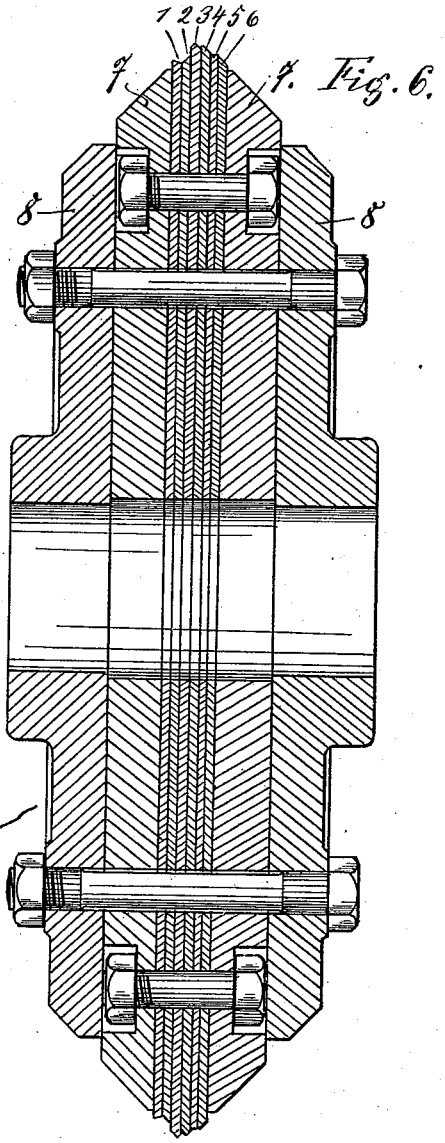

Fig. 6.

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ROLLS FOR THE MANUFACTURE OF CHAINS.

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Fig. 7.

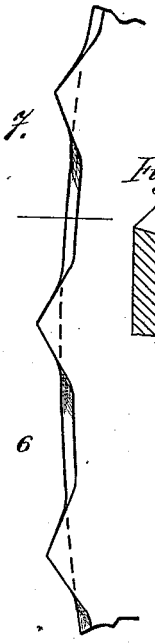

Fig. 7ª.

Fig. 8.

Fig. 8ª.

Fig. 9.

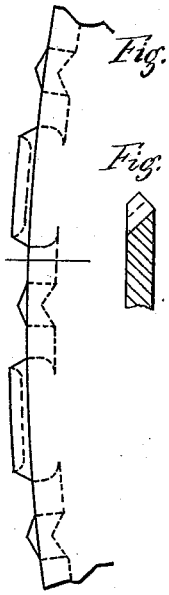

Fig. 9ª.

Fig. 10.

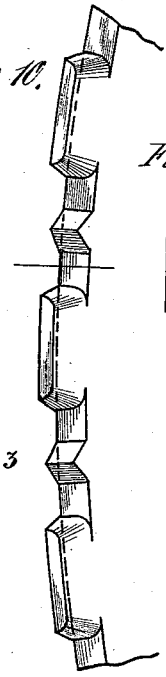

Fig. 10ª.

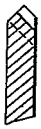

Fig. 11.

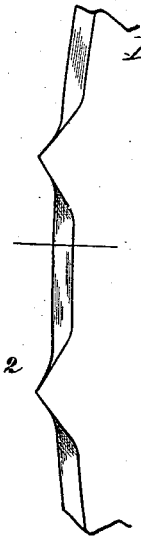

Fig. 11ª.

Fig. 12.

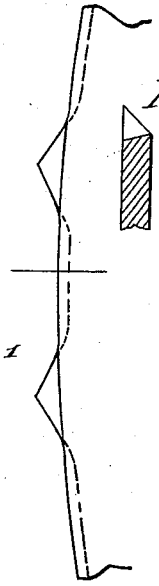

Fig. 12ª.

Witnesses:
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Peter A. Ross.

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by Henry Connett
his Attorney

UNITED STATES PATENT OFFICE.

OTTO KLATTE, OF NEUWIED, GERMANY.

ROLLS FOR THE MANUFACTURE OF CHAINS.

SPECIFICATION forming part of Letters Patent No. 523,432, dated July 24, 1894.

Application filed March 8, 1892. Serial No. 424,127. (No model.) Patented in Germany December 18, 1891, No. 65,548; in France January 12, 1892, No. 218,628; in Luxemburg January 14, 1892, No. 1,550; in England January 23, 1892, No. 1,413; in Belgium January 27, 1892, No. 98,110; in Italy March 31, 1892, LXI, 215, and in Austria-Hungary September 28, 1892, No. 24,464 and No. 71,756.

To all whom it may concern:

Be it known that I, OTTO KLATTE, a subject of the German Emperor, and a resident of Neuwied-on-the-Rhine, Germany, have invented certain Improvements in Mechanism for the Manufacture of Chains from Bars having a Cruciform Section, (or which patents have been granted to me in Great Britain, No. 1,413, dated January 23, 1892; in Germany, No. 65,548, dated December 18, 1891; in France, No. 218,628, dated January 12, 1892; in Luxemburg, No. 1,550, dated January 14, 1892; in Belgium, No. 98,110, dated January 27, 1892; in Italy, LXI, 215, dated March 31, 1892, and in Austria-Hungary, No. 24,464 and No. 71,756, dated September 28, 1892,) of which the following is a specification.

My invention relates to mechanism for making chains according to the mode embodying the three following operations:

First. A bar of a cross-shaped transverse section when heated, is passed through rolls, the grooves of which are formed of four rolls arranged in pairs and provided with projections in such a manner that the depressions required for the formation of the links are produced thereby in the rod, and that each link has imparted to it an internal and external quadrilateral form. The rod is passed through the rolls with its wings or ribs diagonal to the axes of the rolls.

Second. After the rod has passed through the rolls and is thus reduced into a series of connected chain-links of quadrilaterial inner and outer shape, the core or tie left between the alternate links is removed by means of a punch.

Third. Finally the links, which at two places are still connected through the whole thickness of the metal, are separated by shearing while at a dull red heat. To be able to do this, it is absolutely necessary that by rolling the links should receive on the inner sides the form of a rectangle with rounded corners. After shearing, the several links have imparted to them the desired rounded form by pressing or by hand-forging.

In the accompanying drawings I have shown mechanism for carrying out the mode of making chains, briefly described above.

In the drawings—Figure 1 is a front view of the machine. Fig. 2 is a plan view of the same. Fig. 3 is a vertical section, on a large scale, through the co-operative parts of the four rolls, the section being in the plane of the axes of the rolls. Fig. 4 is a view on the same scale as Fig. 3, of a part of the edge of the roll *d*, seen in plan. Fig. 5 is a side view of same, and Fig. 6 is a diametrical section through one of the rolls. Figs. 7, 7^a, 8, 8^a, 9, 9^a, 10, 10^a, 11, 11^a, 12 and 12^a, are detached, fragmentary views which will be hereinafter explained, showing the form of the teeth on the disks which compose the rolls. Figs. 13, 14 and 15 are views illustrating the formation of the chain-links; and Figs. 16, 17, 18 and 19 are views illustrating the mode and means employed for separating the connected links and rounding them. Figs. 20 and 21 show cross-sections of such bars as may be used in the making of chains with my machine.

The machine or mill seen in Figs. 1 and 2 serves to carry out the first operation above described. It consists of four rolls *a*, *b*, *c* and *d*, of equal diameter and arranged in pairs, one pair of rolls being placed at right-angles to the other. The axes of the journals of all four rolls lie in the same plane and all the rolls have the same speed. The journal or shaft, *e*, of the lower roll *d*, is coupled to and driven from the main shaft, *f*; and the journal of the roll *b*, is driven from the main shaft through the medium of gear wheels *g*, *h*, in a well known way. The rolls *a* and *c* are driven from the roll *b* (as herein shown) through the medium of miter gear wheels *k*, on the roll *b*, and the rolls *a* and *c*, respectively, as clearly seen in Fig. 1. The rolls are mounted in a frame A, on a bed-plate B.

I will now describe the construction of the rolls with especial reference to Figs. 3, 4, 5 and 6. Each roll is made up of disks clamped together face to face; Fig. 6 shows the construction; these disks are designated by reference-numerals in the detail views. 1, 2, 3,

4, 5 and 6 are the link-forming disks of the roll; 7, 7, are two clamping disks which embrace the link forming disks, and 8, 8, are outer, reinforcing disks to impart strength. The link-forming disks all have projecting parts or teeth in their peripheries so formed and arranged as to shape or mold the links as the bar passes through the rolls.

In Figs. 7, 8, 9, 10, 11 and 12, I have shown, in side elevation, fragments of the six forming disks comprised in the lower roll *d;* Fig. 7 represents disk 6, Fig. 8 represents disk 5, Fig. 9, disk 4, and so on from right to left in Fig. 4. Figs. 7^a, 8^a, 9^a, &c., are cross-sections of the respective disks 7, 8, 9, &c. The projections on the disks 1, 2 and 3, and those on the respective corresponding disks 4, 5 and 6, are positives and negatives, or reflected images of each other. That is, if the disk 3 were held before a mirror its image would give the form for the disk 4, and the same may be said of disks 2 and 5, and 1 and 6. This will be seen by inspection of Figs. 4, 7, 8, 9, 10, 11 and 12. Furthermore, the three disks 1, 2 and 3 are placed with respect to the other three, 4, 5 and 6, as clearly shown in Fig. 4.

The projections on the forming disks are so shaped that, in the position of the rolls represented in Fig. 3, those lying in the diagonal line from *x* to *x* in Fig. 3 will produce the depressions in the ribs of the bar between the links, designated by *i*, in Figs. 13 and 14, and those projections which lie in the other diagonal line, *y*, *y*, will produce in the other ribs of the bar the apertures in the links designated by *l*, in Figs. 13 and 14. I may say here that Fig. 14 is a cross-section of the bar from which the chain is formed taken in the same plane as the rolls in Fig. 3.

As the four rolls *a*, *b*, *c* and *d* continue to rotate and the bar is carried along, the ribs on the diagonal line *x*, *x*, will next have holes *l* formed in them and those on the diagonal line *y*, *y*, will have depressions formed in them. Thus the rolls alternate in their action as each succeeding link is formed, so that, when the bar shall have passed through the rolls, it will present the appearance seen in Fig. 13, substantially. There will usually be a burr or fin, indicated by dotted lines at *m*, in Fig. 14, and this is driven out by a punch, or by toothed rolls. The bar (seen in Fig. 13) from the rolls will now have its links connected by ties at the several points *i;* this tie is designated by *n* in Fig. 14. These ties are punched out by a punch; and after this is done the links will remain still connected throughout the whole thickness of the metal, only at the points marked *o*, in Figs. 15 and 17. The punch used for driving out the tie *n* may have the form seen in Fig. 16, if desired; this will give to the metal of the link the rounded form seen in Fig. 17. The separation of the links at the points *o* is effected by shearing the metal at these points; and to effect this, without the removal of any metal a link is driven laterally or sidewise with respect to the adjacent links to which it is coupled, as clearly shown in Fig. 17. This is effected by the device illustrated in Figs. 17, 18 and 19, of which Fig. 17 is a side view, Fig. 18 a plan, and Fig. 19 a section on line *r*, *s*, in Fig. 17. A forked, flat bar, *q*, has its branches passed through the adjacent links and arranged to rest on the ends of the link to be sheared off. A punch *p*, forked so as to straddle the two adjacent links, is then placed on the plate *q* and driven down by a blow. The shearing off and final separation of the links is effected after the quadrangular inner form of the links has been transformed from the shape seen in Fig. 15 to that seen in Fig. 17, and this may be done by filing, forging, or any other means.

The action of the forked punch or stamp is fully illustrated in Figs. 17, 18 and 19. In Fig. 17, the horizontal link to the right is shown as forced down and sheared off, while in Fig. 19 the stamp is represented as placed in position ready for operation. To insure the complete separation of the link at *o* it is recommended to repeat the operation, turning the chain over and driving the link also in the opposite direction.

After separation, the links will be pressed or hand-forged in order to give them the proper rounded form.

The cruciform bar from which the chain is to be formed may have either the cross-section seen in Fig. 20, or that seen in Fig. 21. The latter is the more advantageous because the depressions formed in the ribs or wings in rolling it lessen the amount of metal to be displaced and facilitate the formation of the chain with the rolls seen in Fig. 3.

Chains with bridges in the links may be formed by the method above described, it being only necessary to modify the forms of the projections or teeth on the forming disks of the rolls.

I am aware that it is not new, broadly, to form a weldless chain from a cruciform bar, or at least that such a mode of manufacture has been proposed and this I do not claim. I am convinced, however, from my experience in this manufacture, that the methods heretofore proposed, of which I have knowledge will not produce chains of good quality nor can these methods be worked economically.

Having thus described my invention, I claim—

1. A machine for use in the manufacture of weldless link chains from cruciform bars, comprising four die-rolls, each composed of six toothed disks clamped together abreast, the teeth of the disks 1, 2 and 3 being negatives of those on the disks 4, 5 and 6 and displaced, with respect to those on the latter disks, as set forth.

2. A machine for use in the manufacture of chains with solid links from cruciform bars, comprising four die-rolls, *a*, *b*, *c* and *d*, each composed of toothed die-disks, 1, 2, 3, 4, 5 and

6, clamping disks 7 and 8, and means for securing all of the disks firmly together, the teeth or forming dies on the disks 1, 2 and 3, being negatives of those on the disks 4, 5 and 6, and displaced, with respect to those on the latter disks to the extent of one-half the length of a link of the chain to be rolled, substantially as set forth.

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

OTTO KLATTE.

Witnesses:
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H. ALLEN MAXWELL.