

No. 650,101.

Patented May 22, 1900.

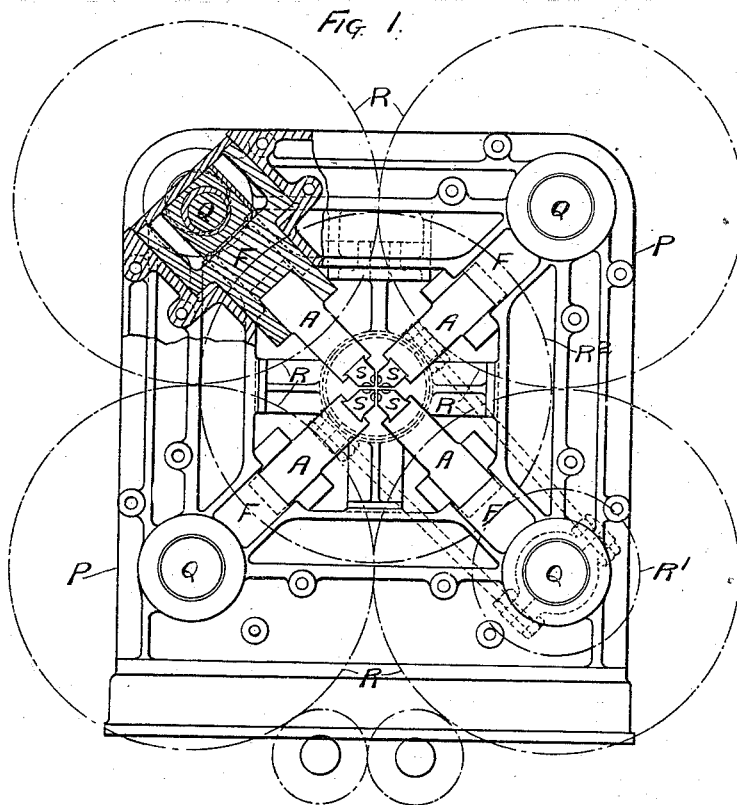
A. G. STRATHERN.

MACHINERY FOR MANUFACTURING WELDLESS CHAINS.

(Application filed Dec. 20, 1899.)

(No Model.)

2 Sheets—Sheet 1.



Witnesses:-  
C. Holloway  
W. C. Pinkney

Inventor:-  
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Attorney

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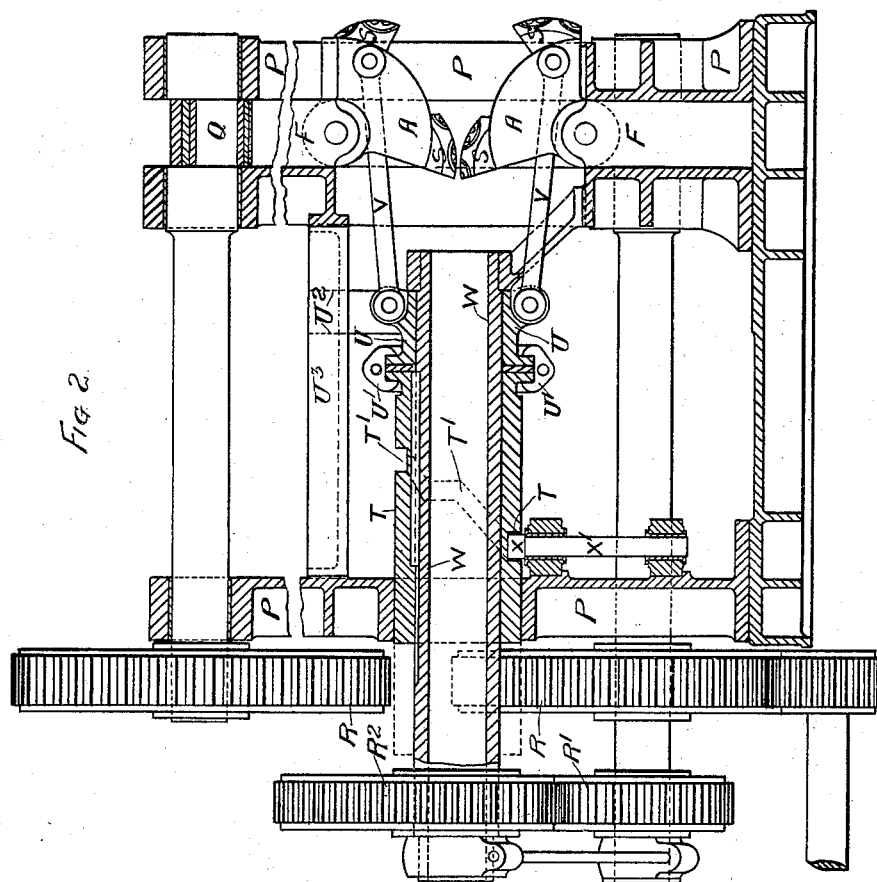
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# UNITED STATES PATENT OFFICE.

ALEXANDER GEORGE STRATHERN, OF STRATHEARN, STEPPS, SCOTLAND.

## MACHINERY FOR MANUFACTURING WELDLESS CHAINS.

SPECIFICATION forming part of Letters Patent No. 650,101, dated May 22, 1900.

Application filed December 20, 1899. Serial No. 740,980. (No model.)

*To all whom it may concern:*

Be it known that I, ALEXANDER GEORGE STRATHERN, a citizen of the United Kingdom of Great Britain and Ireland; residing at 5 Strathearn, Stepps, county of Lanark, Scotland, have invented certain new and useful Improvements in Machinery for the Manufacture of Weldless Chains, (which have been patented in Great Britain, dated July 13, 1899; 10 in France, dated May 31, 1899; in Belgium, dated May 31, 1899; in Germany, dated May 31, 1899; in Austria, dated May 29, 1899; in Hungary, dated May 31, 1899; in Italy, dated May 27, 1899; in Spain, dated May 31, 1899; 15 in Sweden, dated May 30, 1899, and in Russia, dated June 1, 1899,) of which the following is a specification.

This invention relates to improvements in the manufacture of weldless chains and in 20 machinery for the purpose, such as described in my pending United States applications, Serial Nos. 672,180 and 710,541, and has for its object particularly the provision of improved means for rotating the dies through the de- 25 sired arc of a circle in order to effect the stamping of the links upon a bar of cruciform or other section.

The invention is illustrated by the accompanying drawings, Figure 1 being an end 30 view, partly in section, of the chain-making machine, and Fig. 2 a longitudinal vertical section of the same.

In carrying out the invention I provide a rectangular frame P, at the corners of which 35 are centered short shafts Q, each carrying an eccentric or crank arranged to act upon sliding blocks F, carried in guides in and extending toward the center of said frame P. These blocks F have arms A pivoted to their inner 40 ends, which carry wedge-shaped dies S, adapted to enter the angles of the cruciform bar or into the core of a bar of other shape when the sliding blocks F are advanced by the action of the cranks or eccentrics on the shafts 45 Q. The oscillating arms A preferably carry two or more dies S, which will permit of the said dies being brought into operation alternatively or successively. The crank or eccentric shafts Q are geared together by spur- 50 wheels R in order to cause the dies S to press simultaneously on the bar. The acting faces of the dies S are curved, the curves being de-

scribed from a center considerably to one side of the pivot, as shown particularly at Fig. 2, so that after the dies S have been pressed into 55 the core of the bar a further rotation of the crank or eccentric, and consequently further advancement of the blocks F, carrying the dies S, causes them to rotate and crush the bar into link form. The movement of the dies S is con- 60 trolled by a rotating cam T and a non-rotating sliding sleeve U, the latter being connected to the die-arms A by rods V. The cam T consists of a sleeve which surrounds a hollow shaft W and has a scroll T' cut in it, portions of which 65 scroll are at right angles to the axis of said sleeve and other portions inclined at other angles thereto, whereby the desired longitudinal movement is imparted to the cam-sleeve T by means hereinafter described. The cam- 70 sleeve T slides on the hollow shaft W, to which it is connected by a feather-key, said shaft W being caused by gearing R' R<sup>2</sup> to revolve at half the speed of the crank-shafts Q, and the cam-sleeve T is connected to the sliding 75 sleeve U by a loose ring U' made in halves, which allows the cam-sleeve T to rotate while the sleeve U has a reciprocating motion only, the sleeve U being prevented from turning by an extension U<sup>2</sup> upon it engaging a stationary 80 part U<sup>3</sup> of the framing P. The race or scroll T' of the cam-sleeve T, into which a roller X on a stationary shaft or pin X' enters, is formed so that when the dies S are at their farthest-out position the sliding sleeve T is 85 held stationary—that is to say, it has no longitudinal movement; but as soon as the dies S have been pressed into the core of the bar an inclined part of the cam-race T' engages with the cam-roller X, carried on the station- 90 ary shaft X', and effects the sliding action of the scroll-cam T and the sleeve U, and consequently a rolling action of the dies S before mentioned. After the dies S have moved along the bar the distance required, another 95 straight part of the cam race or scroll T' engages with the roller X on the stationary shaft X' until the dies S are withdrawn from the bar. Another inclined part of the cam race or scroll T' thereafter comes into action and 100 pulls the cam-sleeve T and sleeve U along, thereby rotating the die-arms A the distance required to bring the second set of dies S into position. The second half of the cam-race T'

is constructed in a similar way, so that a corresponding forward oscillating and withdrawing motion is given to the second set of dies S, and when these have been withdrawn from the bar another angular part of the cam-race T' causes the sleeves T and U to return to the normal position, thereby bringing the first set of dies S back to the original starting-point. The same operations are repeated throughout the length of the bar.

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

1. A machine for making weldless chains consisting of a rectangular frame having guides extending diagonally toward the center, short shafts centered at the outer ends of said guides, and geared together, sliding blocks operated simultaneously in said guides by crank or eccentric portions on the short shafts, die-carrying arms pivoted to the sliding blocks, rods connected to the pivoted arms and to a sliding cam-sleeve keyed to and surrounding a hollow shaft, a scroll on said cam, and a roller on a stationary shaft or pin for traversing said sleeve longitudinally in order to partially rotate the die-arms, substantially as described.

2. In a machine for making weldless chains, the combination with a rectangular frame having guides extending diagonally toward the center, of shafts centered at the outer ends of said guides, and geared together, crank or eccentric portions on said shafts, sliding blocks in said guides, and curved die-arms,

pivoted to said blocks, said cranks or eccentrics being adapted to advance and retract the sliding blocks connected to the die-carrying arms, and means for oscillating said arms, substantially as described.

3. In a machine for making weldless chains, the combination with a rectangular frame having guides extending diagonally toward the center, and crank-shafts carried at the outer ends of said guides, and operating sliding blocks, of die-carrying arms pivoted to said blocks, and means for oscillating said arms, substantially as described.

4. In a machine for making weldless chains the combination of pivoted arms carrying curved dies, rods connected to said arms and to a sliding sleeve loosely surrounding a rotating hollow shaft, a lug projecting from said sliding sleeve and engaging a stationary part of the machine to prevent the sleeve from turning with the shaft, a rotating and sliding cam-sleeve keyed to the hollow shaft and connected to the loose sleeve by an annular ring, a scroll in the rotating cam-sleeve, and a roller on a stationary shaft or pin engaging said scroll to impart a longitudinal movement to the sleeves and corresponding rotative movement to the pivoted arms substantially as described.

In witness whereof I have hereunto set my hand in presence of two witnesses.

ALEXANDER GEORGE STRATHERN.

Witnesses:

WALLACE FAIRWEATHER,  
JNO. ARMSTRONG, Jr.