2 Sheets—Sheet 1.

J. H. HELM.

Machine for Forming Chain-Links.

No. 200,196. Patented Feb. 12, 1878.

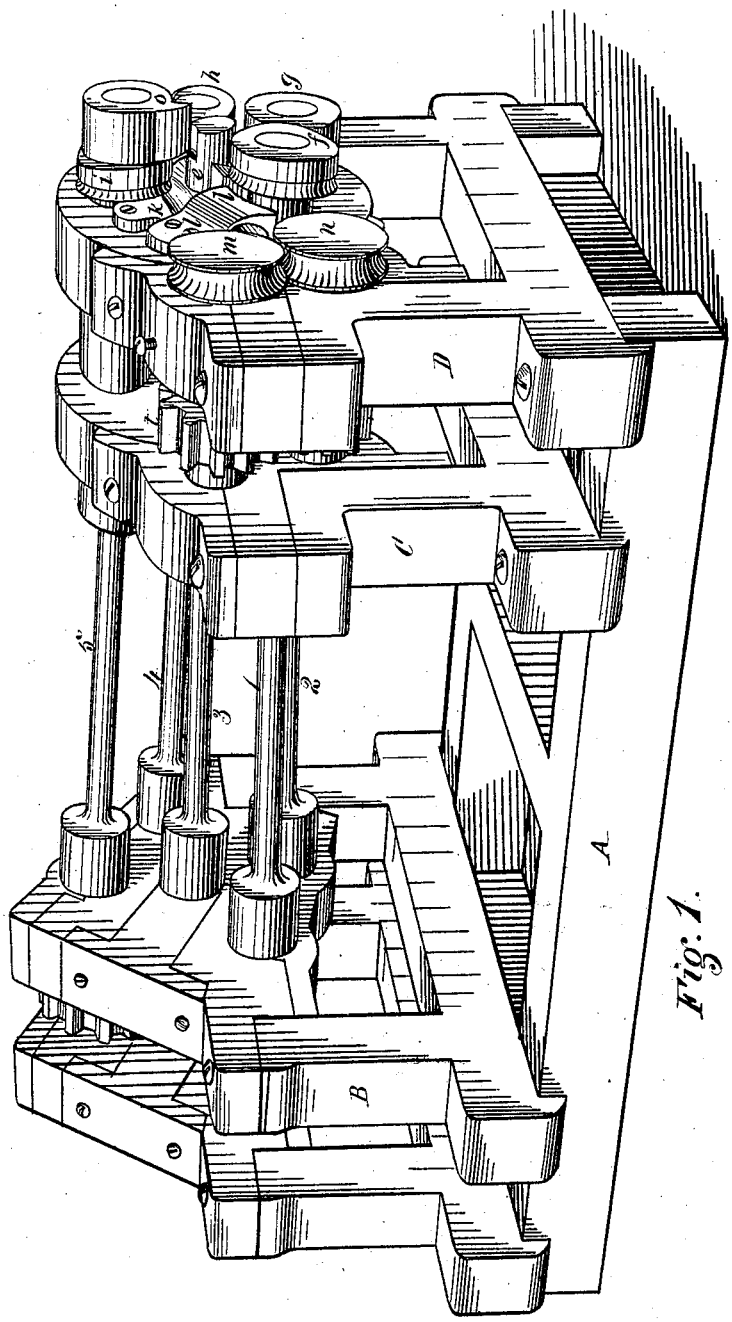

Fig: 1.

Witnesses
Francis L. Clark
Albert Martin

Inventor J. Henry Helm
By Attorney Johnston & Donn

2 Sheets—Sheet 2.

J. H. HELM.

Machine for Forming Chain-Links.

No. 200,196. **Patented Feb. 12, 1878.**

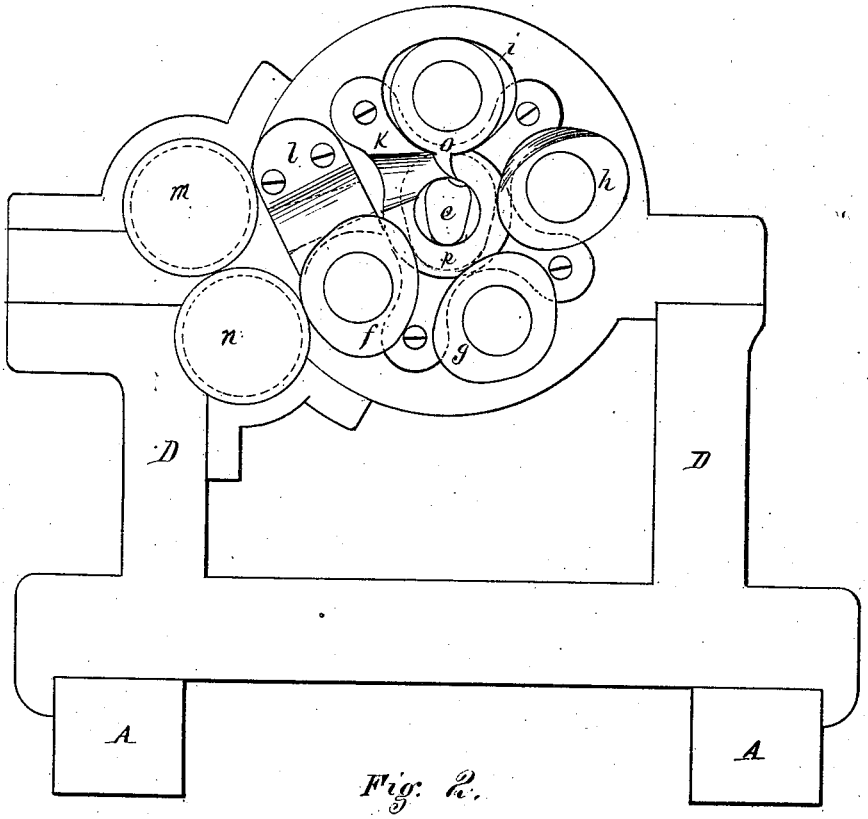

Fig. 2.

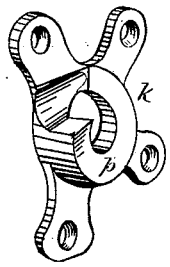

Fig. 3.

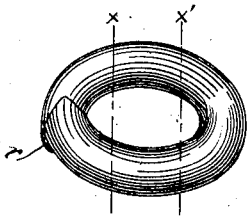

Fig. 4.

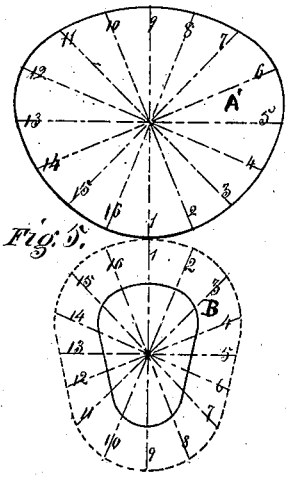

Fig. 5.

Witnesses
Francis L. Clark
Albert A. Martin

Inventor A. Henry Helm
By Attorney Johnston & Dunn.

UNITED STATES PATENT OFFICE.

JOHN HENRY HELM, OF ALLEGHENY, PENNSYLVANIA.

IMPROVEMENT IN MACHINES FOR FORMING CHAIN-LINKS.

Specification forming part of Letters Patent No. **200,196**, dated February 12, 1878; application filed September 18, 1877.

To all whom it may concern:

Be it known that I, JOHN HENRY HELM, of the city of Allegheny, in the county of Allegheny and State of Pennsylvania, have invented a certain new and useful Improvement in Machines for Forming Chain-Links; and I hereby declare that the following is a full, clear, and exact description thereof, reference being had to the accompanying drawings, forming part of the same.

My invention relates to an improvement in the construction and operation of machines for forming chain-links; and it consists of a link-forming mandrel and suitable mechanism for bending the iron thereon, in combination with feed-rollers operating on the iron from which the link is formed, so that it will be fed more rapidly than would be taken up by the mandrel in the absence of said feed-rollers, to compensate for the spiral form of the link-blank, said feed-rollers being susceptible of adjustment for regulating their impinging force on the iron from which the link-blanks are formed, that the feed of the iron will vary with the irregular form of said mandrel.

To enable others skilled in the art to which my invention pertains to construct and use the same, I will proceed to describe its construction and operation.

In the accompanying drawings, forming part of this specification, Figure 1 is a perspective view of my improvement in machines for forming blanks for chain-links. Fig. 2 is an end elevation of the same. Fig. 3 is a perspective view of the guide used in combination with the revolving mandrel. Fig. 4 is a perspective view of a blank for a chain-link. Fig. 5 is a diagram representing a mode of obtaining the contour of the cams.

Similar letters of reference indicate corresponding parts in all the figures.

Referring to the drawings, A represents the base of the machine. B is the housings for the driving-gear. C and D are the housings for the revolving mandrel *e*, cams *f g h i*, and revolving cutter *o*. On the face of the housing D is secured, by screw-bolts, the guide *k*, represented in Fig. 3, through which guide the revolving mandrel *e* projects. To the left of the guide *k* is arranged a guide, *l*, and feed-rollers *m* and *n*. The mandrel *e* has a series of cams, marked *f g h i*, arranged around it for the purpose of pressing the rod of iron from which the blanks are made against the mandrel. The revolving cutter *o* is arranged directly above the mandrel *e*, the latter serving the purpose of an anvil for the cutter *o* in the operation of cutting the blanks from the iron, which is continuously forming on the mandrel *e* and projecting outward toward the end of it. The cutter *o* travels a little faster than the link at its greatest diameter, so that the cutter will have a cutting and drawing action at the same time, thereby severing the formed link from the forming link on the mandrel *e*. The end of the mandrel *e* is beveled—that is to say, it is longer on the side having the greatest diameter, which is the part of the mandrel which serves the purpose of an anvil for the cutter *o*. This beveling of the mandrel is necessary for the proper discharge of the link formed from the mandrel and the forming link. The incline *p* of the guide *k* gives the pitch of the spiral of the iron on the mandrel, and also the opening *r* of the link-blank. The guide *k* is made detachable, so that it may be readily renewed or replaced with another when worn out.

The axis of the cam *f* is provided with a gear-wheel, which meshes with a gear-wheel on the axis of the feed-roller *n*, and this meshes with a gear-wheel, *t*, on the axis of the feed-roller *m*. The feed-rollers *m* and *n* are used for the purpose of properly supplying the iron from which the links are formed to the mandrel *e* and cams *i h g f*, and for preventing the back action of the iron.

Experience has demonstrated that the feed-rollers are necessary to a proper formation of the link by the mandrel *e* and cams *i h g f*, and has also demonstrated that by the use of the feed-rollers *m n*, mandrel *e*, and cams *i h g* a very good link may be formed; but preference is given to the use of the four cams in combination with the mandrel and feed-rollers. The axes of the mandrel, cam, and cutter are coupled with driving-gear, which have their bearing in the housing B, by means of the couplings 1 2 3 4 5. The coupling 1 drives the cam *f*, and the coupling 2 drives the cam *g*, and coupling 3 drives the mandrel *e*, and coupling 4 drives the cam *h*, and coupling 5

drives the cam *i* and cutter *o*. The center wheel in the housing B is the driving-wheel, and meshes into the wheels which give motion to the couplings 1 2 4 5. The center driving-wheel gives motion to coupling 3, which rotates the mandrel *e* and also gives a reverse motion to the couplings 1 2 4 5.

The edge of the cams *f g h i* and the feed-rollers *m* and *n* are grooved. The lines of the part A′ of the diagram (shown in Fig. 5) are brought in line with the lines of part B consecutively, beginning with lines numbered 1, and then marked at the periphery of the link. Thereby the proper outline will be obtained for the cams hereinbefore referred to.

The operation of my improvement is as follows: The iron is fed to the mandrel *e* by placing it between the feed-rolls *m* and *n*, which force it through the guide *l* and against the incline *p* of the guide *k*, which gives the desired pitch to the spiral of the iron as it is bent around the mandrel *e* by the cams *f g h i*, and the cutter *o*, when the iron is projected outward sufficiently on the mandrel, cuts off a link-blank at each revolution of the mandrel, and the separated blank drops from the machine into a suitable receptacle. The large diameter of the blank at the line *x*, when closed so that the blank at line *x* and *x′* are the same, gives the desired lap for welding.

The feed-rollers *m* and *n* are used in combination with the mandrel *e* and bending mechanism to feed the iron from which the link-blank is formed faster than it would be taken up by the mandrel in the absence of said feed-rollers, which increased feed of the iron is necessary to compensate for the increased length of iron required for the spiral form of the link-blank. The feed-rollers are susceptible of adjustment for regulating their impinging force on the iron in the operation of feeding it, so that the feed will vary with the irregular form of the mandrel *e*, which adjustment of the feed-rollers is obtained by means of a set-screw in the cap of one of the bearings for the axes of the feed-rollers. By means of this adjustment the impinging force of the feed-rollers may be gaged so that while the longer radii of the mandrel are passing the first cam the feed will be sufficient, but that while the shorter radii are passing said cam, and less metal is needed, the feed-rollers will slip over the rod.

Having thus described my invention, what I claim as new, and desire to secure by Letters Patent, is—

1. In a machine for forming chain-links, the feed-rollers *m* and *n*, and a revolving mandrel over which the links are formed, said mandrel being surrounded with a series of revolving cams which press the iron against said mandrel, and a revolving cutter for severing the formed link from the forming link, substantially as herein described.

2. In a machine for forming chain-links, the feed-rollers *m* and *n*, and the detachable guide *k* and cutter *o*, in combination with the mandrel *e* and suitable number of cams for pressing the iron from which the links are formed against the periphery of the mandrel, substantially as herein described.

3. In a machine for forming chain-links, the feed-rollers *m n* and cutter *o*, in combination with the mandrel *e* and cams for pressing the iron from which the links are formed against the periphery of said mandrel, substantially as herein described.

4. The feed-rollers and adjusting-mechanism for regulating their impinging force for feeding the iron for the link-blank, as required by its spiral form and the longer and shorter radii of the mandrel, in combination with said mandrel and suitable bending mechanism, substantially as described.

In testimony that I claim the foregoing I have hereunto set my hand this 15th day of September, A. D. 1877.

J. HENRY HELM.

Witnesses:
JAMES J. JOHNSTON,
WILTON C. DONN.