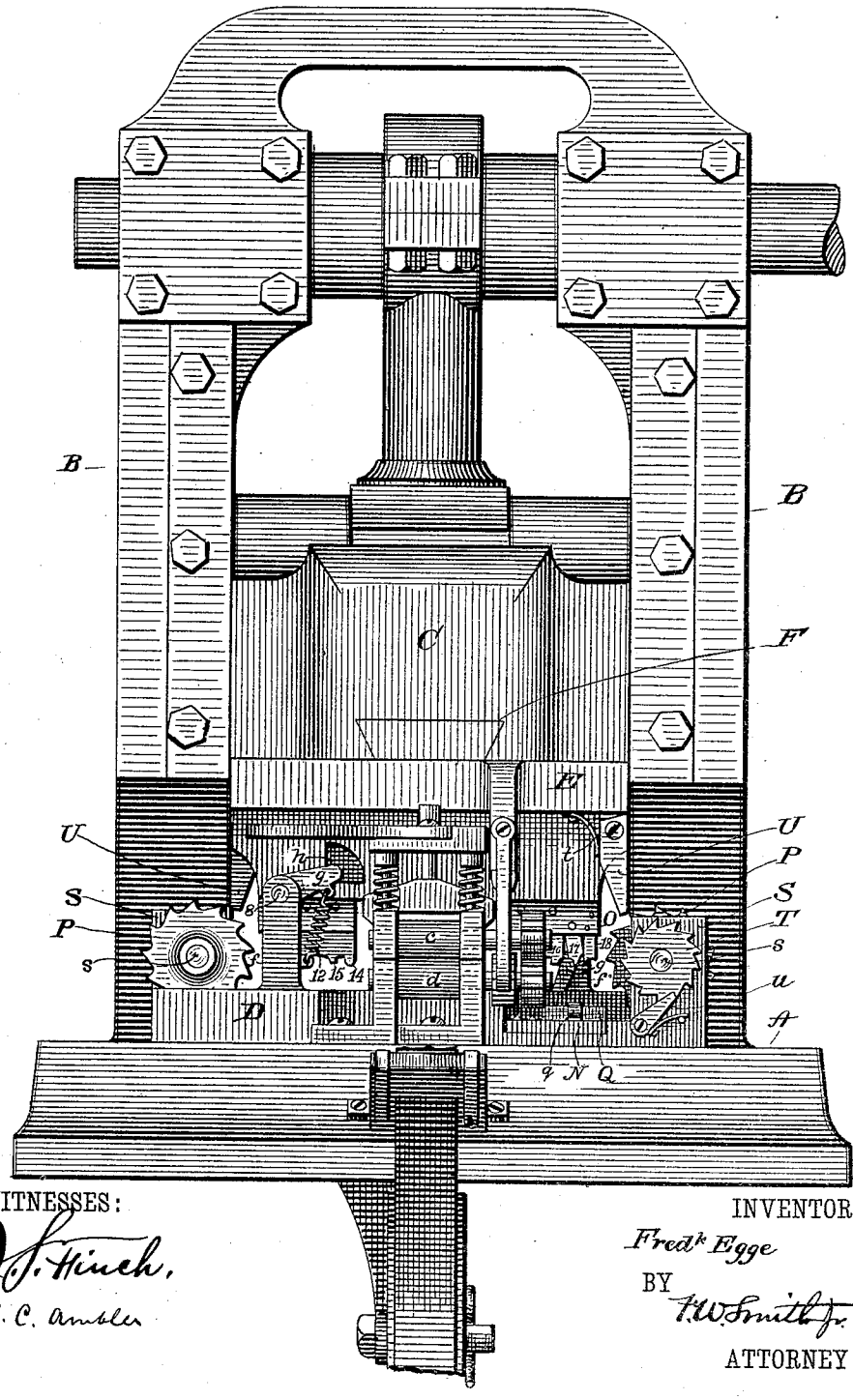
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F. EGGE.

MACHINE FOR MAKING SHEET METAL CHAINS.

No. 451,658. Patented May 5, 1891.

Fig. 1.



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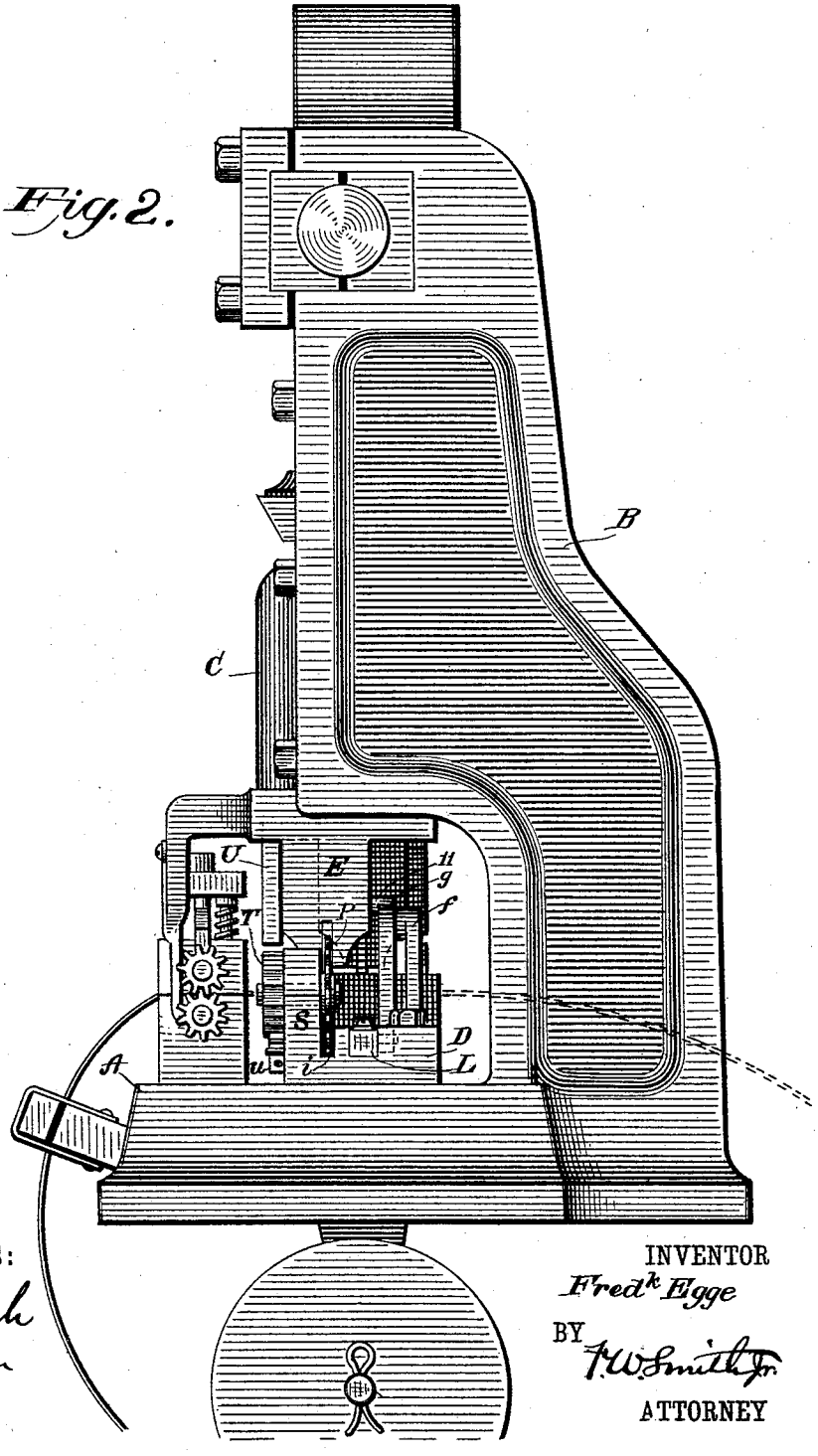
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F. EGGE.

MACHINE FOR MAKING SHEET METAL CHAINS.

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Fig. 2.



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Fig. 3.

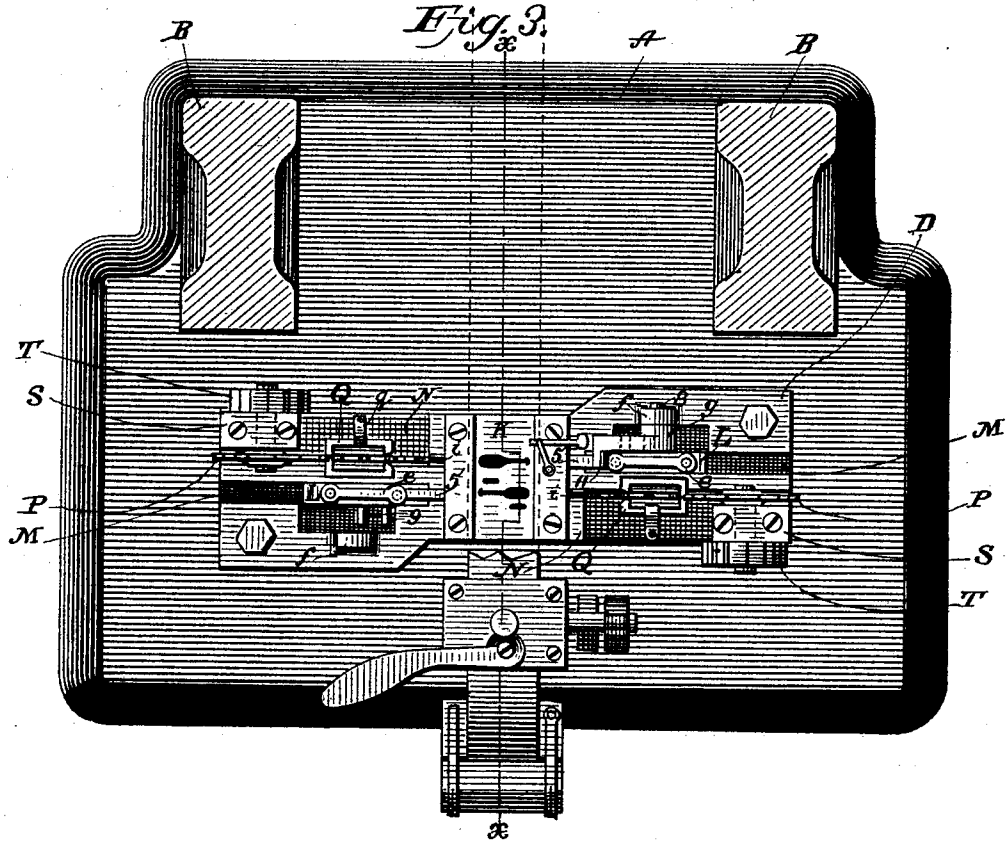
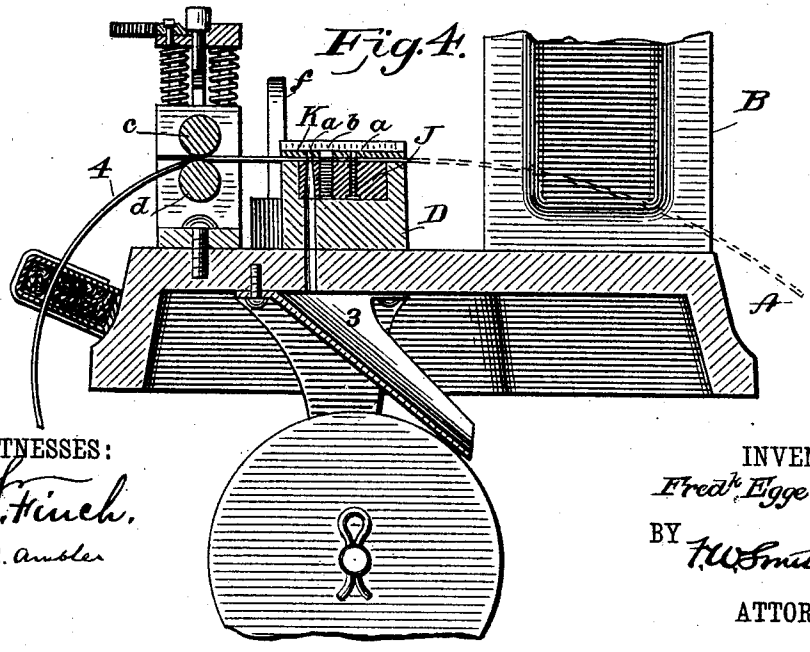


Fig. 4.



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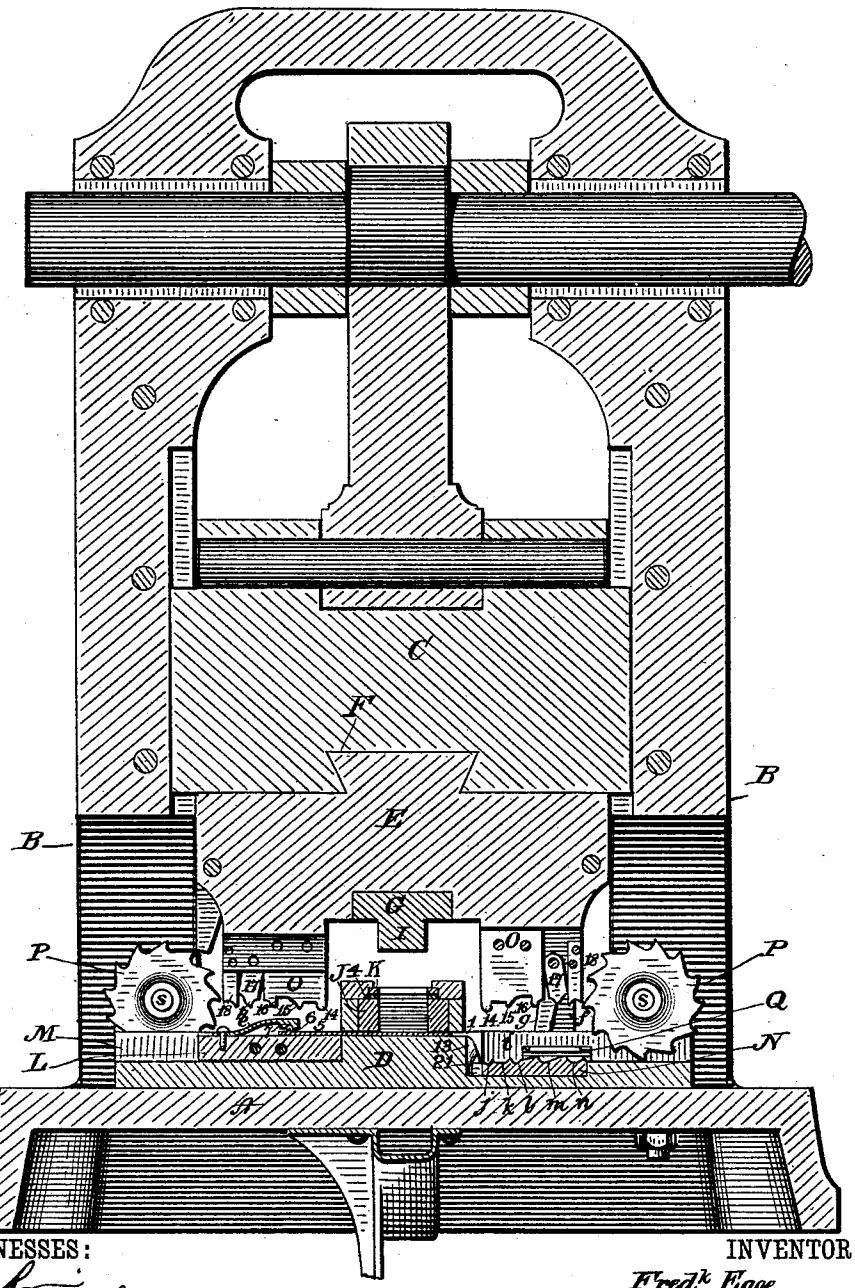
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F. EGGE.

MACHINE FOR MAKING SHEET METAL CHAINS.

No. 451,658. Patented May 5, 1891.

Fig. 5.



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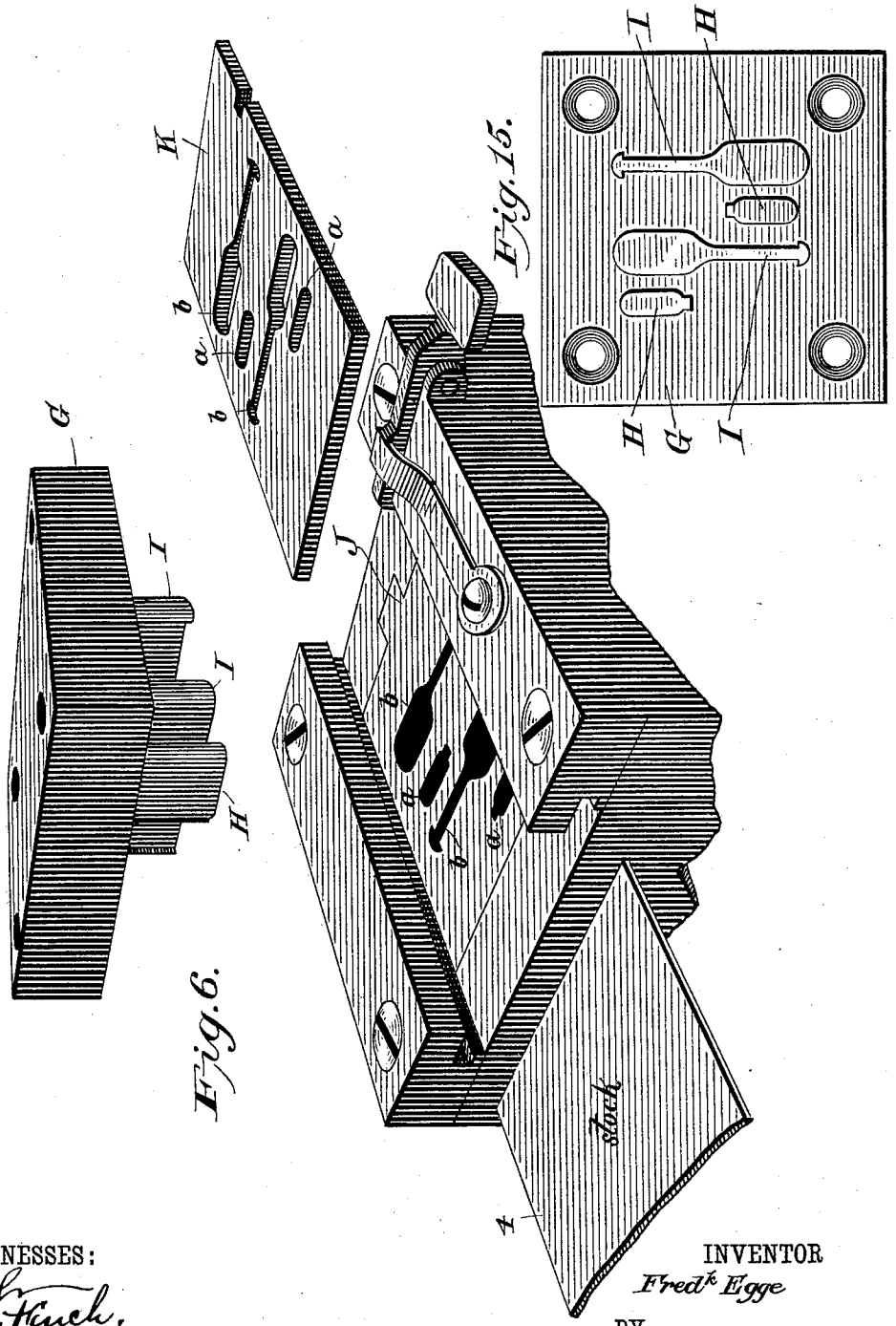
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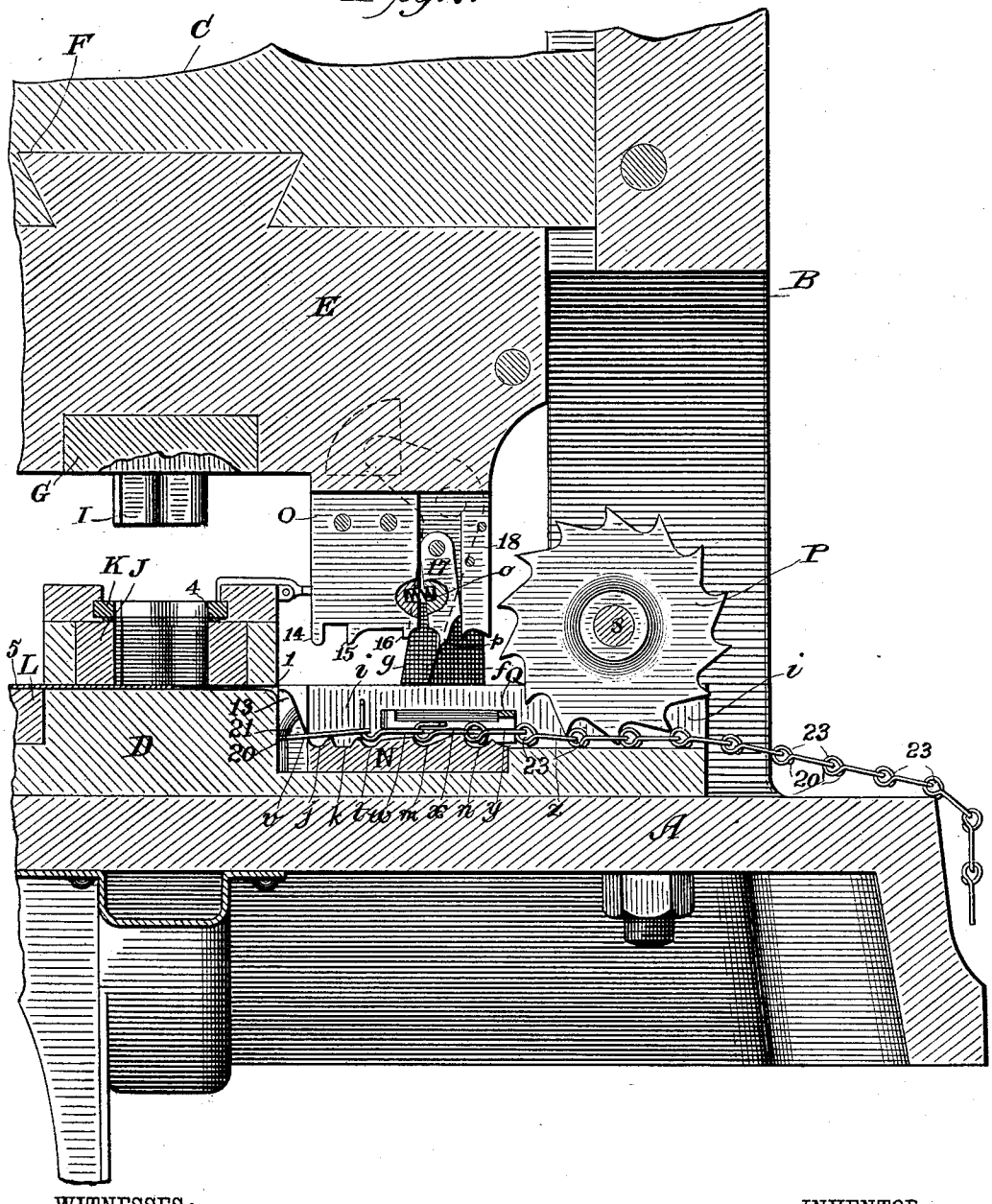
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MACHINE FOR MAKING SHEET METAL CHAINS.

No. 451,658. Patented May 5, 1891.

Fig. 7.



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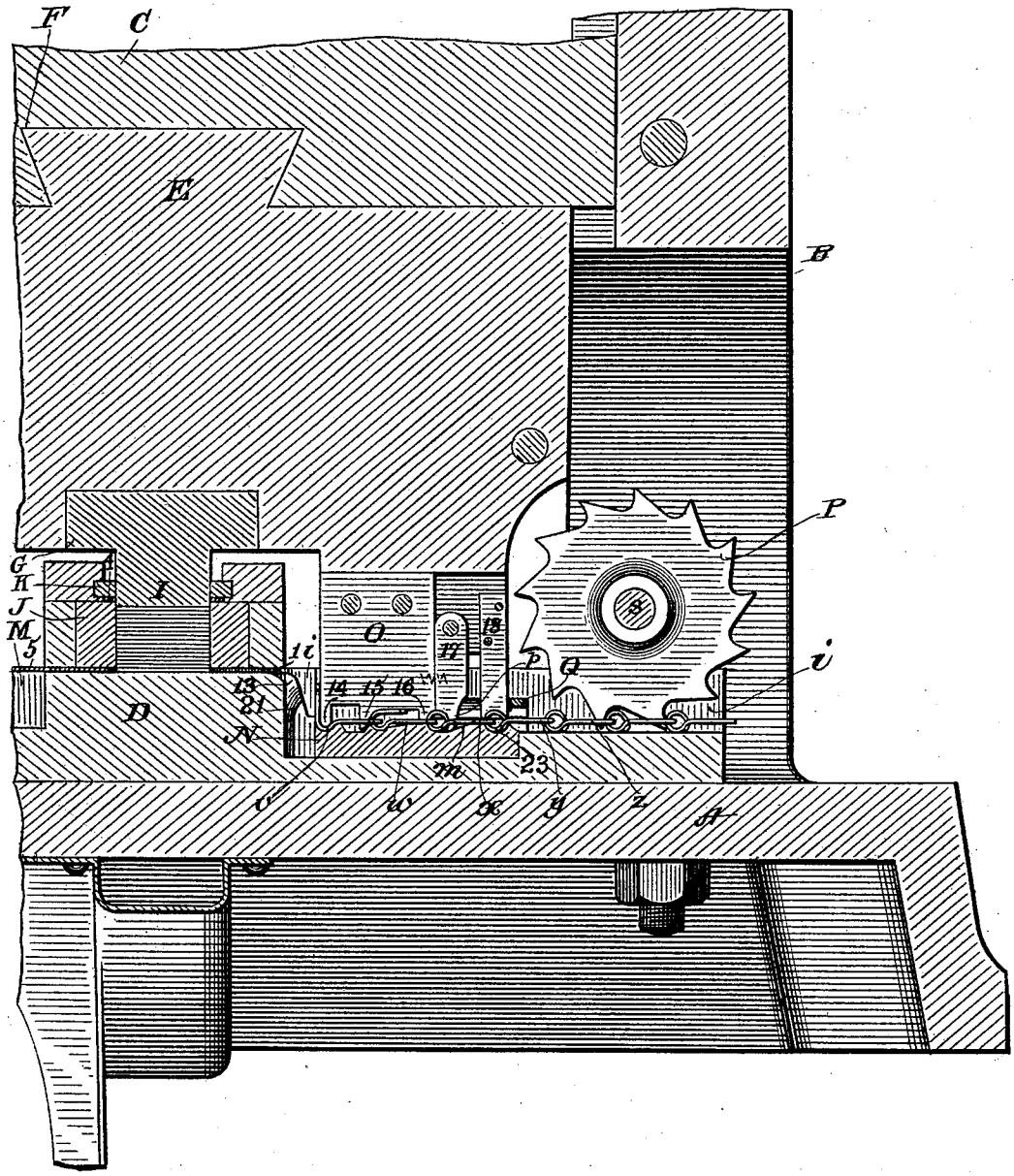
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F. EGGE.

MACHINE FOR MAKING SHEET METAL CHAINS.

No. 451,658. Patented May 5, 1891.

Fig. 8.



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F. EGGE.

MACHINE FOR MAKING SHEET METAL CHAINS.

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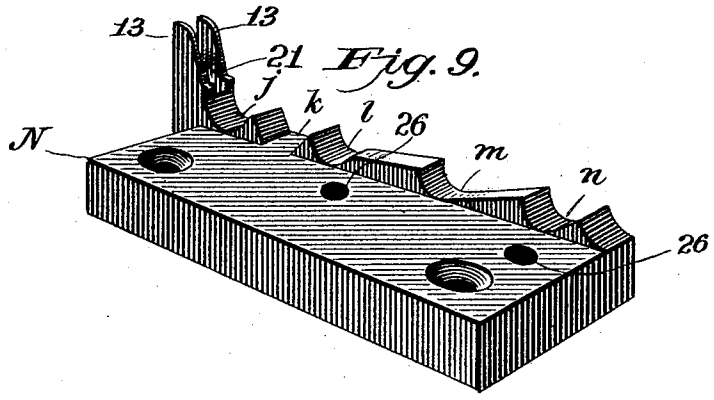


Fig. 9.

Fig. 10.

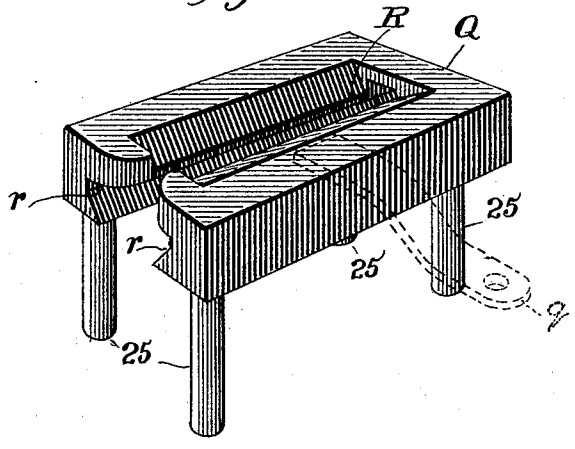


Fig. 11.

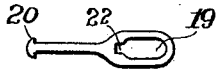
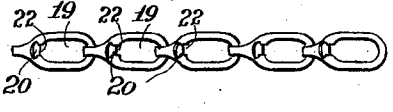


Fig. 12.



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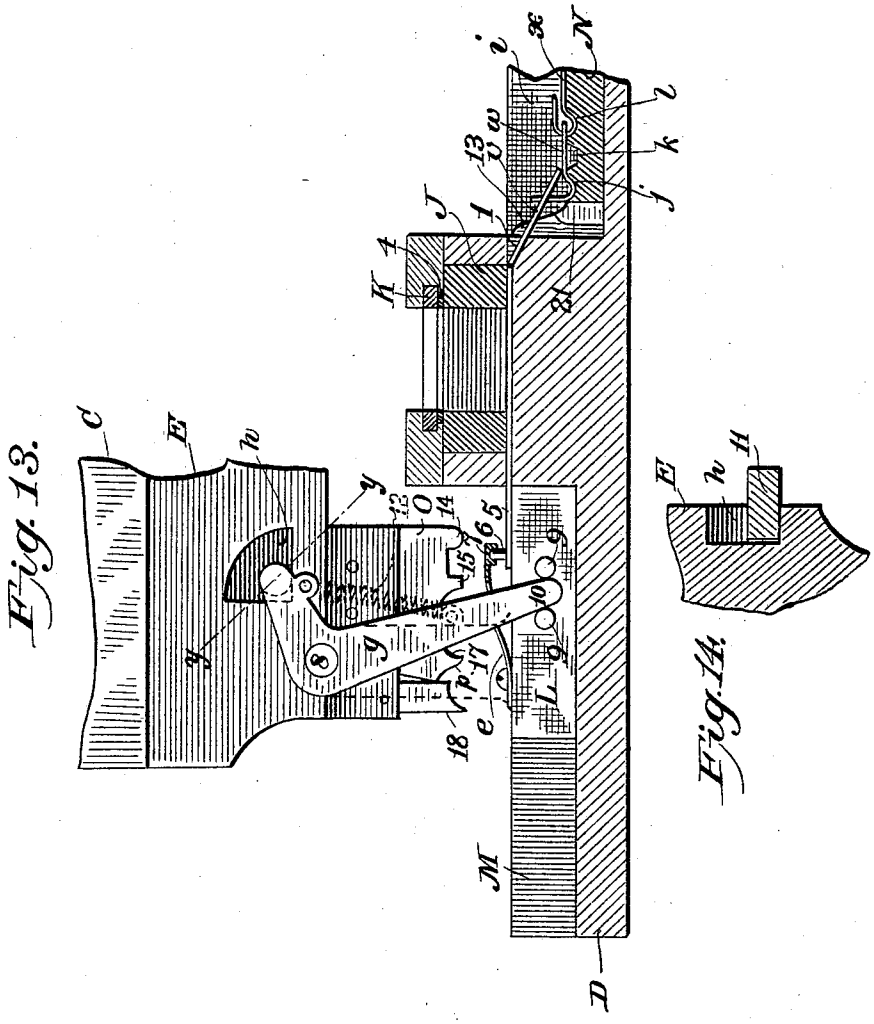


Fig. 13.

Fig. 14.

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UNITED STATES PATENT OFFICE.

FREDERICK EGGE, OF BRIDGEPORT, CONNECTICUT, ASSIGNOR TO THE SMITH & EGGE MANUFACTURING COMPANY, OF SAME PLACE.

MACHINE FOR MAKING SHEET-METAL CHAINS.

SPECIFICATION forming part of Letters Patent No. 451,658, dated May 5, 1891.

Application filed November 20, 1890. Serial No. 372,088. (No model.)

To all whom it may concern:

Be it known that I, FREDERICK EGGE, a citizen of the United States, residing at Bridgeport, in the county of Fairfield and State of Connecticut, have invented certain new and useful Improvements in Machines for Manufacturing Sheet-Metal 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 has reference to certain new and useful improvements in machines for automatically making chain from sheet metal, and has for its object to simultaneously produce two separate chains by means of one machine and from a single continuous strip of sheet metal, which chain shall be exceeding light and very strong.

In the accompanying drawings, Figure 1 is a front elevation of my improvement; Fig. 2, a side elevation; Fig. 3, a plan view with the uprights of the press and the parts carried and supported thereby removed; Fig. 4, a sectional elevation at the line *x x* of Fig. 3; Fig. 5, a longitudinal sectional elevation; Fig. 6, a detail perspective, on an enlarged scale, of the punches, dies, stripper, and stock in detached condition; Figs. 7 and 8, detail broken sectional elevations showing the operation of the link feeding and bending devices; Fig. 9, a detail perspective of the bending-block; Fig. 10, a detail perspective of the guide-block; Fig. 11, a detail of the blank from which the chain-links are made; Fig. 12, a detail of a short section of the chain; Fig. 13, a detail broken sectional elevation of the mechanism for feeding the link-blanks to the bending-block; Fig. 14, a detail section at the line *y y* of Fig. 13, and Fig. 15 a detail bottom view of the punches.

Similar letters and numerals denote like parts in the several figures.

In the manufacture of chain from a sheet-metal strip by automatic machinery it has heretofore been the practice to blank out the links consecutively and in uniform order from the metallic strip to form a single continuous length of chain.

In my improvement the links are blanked out alternately in two series, the links of one series being the reverse of the links of the other series. The links of each series, as fast as they are blanked out, drop into separate wells, whence they are fed out in opposite directions and interlooped to form two distinct chains. There are two sets of mechanisms for feeding, interlooping, and bending the links into finished shape and for feeding the completed chains, and as both of said sets are exactly alike I will describe only one of them.

The power-press which I use in carrying out my invention is of the ordinary construction, and I will not describe the same, but will merely refer to the parts thereof by letter.

A is the platform of the press, B the uprights, and C the reciprocatory gate. The bed-plate D of my improvement is secured upon the platform A.

I will first describe the means whereby the links are blanked out, deposited in the wells, and then fed consecutively to the bending and finishing devices.

E is a block which is secured to the bottom of the gate C in any suitable manner, as by a dovetail connection F. The punch-head G is secured to the block E in the usual way, and the punches H and I depend from said block. The punches H cut the eyes from the blank, while the punches I sever the link-blank from the metal strip. These punches H and I are arranged in alternate pairs, as shown at Fig. 15.

J is the die-block secured to the bed-plate D, and K is the stripper secured to said block in any ordinary manner. The punch-openings *a* and *b* in said block are deepened to form wells, and the openings *b* extend clear through the back and lead into shallow grooves 1 in the bed-plate D. These grooves are only deep enough to accommodate a single link, whereby push-fingers reciprocated within said grooves may push the links successively through said grooves to the bending-block, as will be presently set forth. The openings *a* lead into a chute 3, by which the cuttings of the eyes are conveyed to any suitable waste-receptacle. The metallic strip 4 is fed between the punches and dies by the ordinary feed-rolls *c d*, which are constructed and op-

erated in the same manner as shown and described in Letters Patent No. 202,528, issued to me April 16, 1878.

Referring particularly to Figs. 3, 13, and 14, L is a push-bar having a free reciprocatory movement within slot M in the bed D.

5 is a push-finger adapted to reciprocate within groove 1, whereby the links are thrown into the bending-block, and having stud 6 at the rear end.

e is a spring, one end of which is secured to the bar L, while the other end has formed therein a socket 7, into which the stud 6 projects. The object of this stud-and-socket connection is to prevent injury to the machine should anything obstruct the play of the finger, for in the event of the latter the spring *e* will buckle, and thereby cause the immediate disengagement of the stud and socket.

f is an ear rising from the bed D, and to this ear at 8 is pivoted a bell-crank lever *g*. The toe 10 of this bell-crank extends between pins *g'*, which project from the bar L, while a pin 11 extends laterally from the upper end of said lever within a recess *h*, formed in the block E. A coil-spring 12 is secured to the ear and lever, whereby the lever is returned to normal position during the depression of the press-gate. When said gate is elevated, the upper end of the lever *g* will be elevated, thereby throwing the toe end inward to operate the link push-finger 5. When the gate is depressed, the spring 12 will cause the toe end of the lever to be retracted, thereby effecting the withdrawal of the push-finger, so that the next succeeding link may drop into the groove 1.

Having now described the punches and dies for blanking the links and depositing them within the well, and also the devices whereby said links are one by one removed from said well and conveyed to the bending devices, I will now describe the means which I employ to bend and finally shape the links.

i is a feed-channel in the bed-plate D, within which channel the bending-block N is secured. The rear of this block has a pair of guide-ears 13, which project upward, and the groove 1 leads directly into the space between these ears. The bending-block is formed with depressions *j*, *k*, *l*, *m*, and *n*, within which the links are bent and shaped.

O is the bender secured to the block E and having depending projections 14, 15, and 16. Pivoted to the block E is a curler 17, which is normally separated from the bender by a coil-spring *o*, (see Fig. 7,) the nose of this curler being tapered on the outside, as seen at *p*.

18 is a shaper secured to the block E.

The blank is shown in detail at Fig. 11, and has an eye 19 at one end and a head 20 at the other.

Referring to Fig. 13, it will be seen that a blank when pushed by the finger 5 will fall between the ears 13 with its eye over the shank of the preceding partially-formed link, and by reference to Fig. 7 it will be seen that after the chain has been pulled through the feed-channel by the action of the feed-sprocket P (to be hereinafter described) the said blank will have been advanced along the feed-channel *i*, so as to rest horizontally upon the bending-block with the head 20 immediately behind the shoulders 21. The blank is then in a position to receive the first bending operation.

There are three operations to the bending, and in order to simplify an explanation of them I have designated the blanks by *v w x y z*. When the bender O descends, the round-nosed projection 14 will bend the shank of the blank *v* (see Fig. 7) into the shape shown at Fig. 8, the depression *j* in the bending-block co-operating with said projection to produce this result. The blank *w* is operated upon by the projection 15, whose forward edge is inclined so as to strike the end of said blank and bend it down to a horizontal plane, as shown in Fig. 8. During this bending operation the projection 15 is within the eye of the succeeding link, so that there can be no longitudinal displacement of the links during the bending. The blank *x* is operated upon by the projection 16 and curler 17. The projection 16 backs up the rear of the partially-bent shank of the blank *x*, while the tapered nose of the curler, striking the end of the shank and curling it downward, is thrown inward by riding down the inclined floor of the depression *m*, thereby tightly squeezing the end of the shank and locking the head 20 through the notch 22 in the link-eye, which will be readily understood by reference to Figs. 8, 11, and 12. The shaper 18 is perhaps unnecessary, since its function is merely to give uniformity to the chain-loops 23, and it operates upon the link *y* to correct any trifling inaccuracies that might result from the bending operations.

The link *z* forms a part of the finished chain, and is acted upon by a tooth of the sprocket-wheel P to pull the four succeeding blanks into position for succeeding bending operations.

To sum up: The first bending operation is performed by the bender projection 14 to shape the blank *v*, Fig. 7, into the form shown at *v*, Fig. 8. The second bending operation is performed by the projection 15 to shape the blank *w*, Fig. 7, into the form shown at *w*, Fig. 8. The third bending operation is performed by the projection 16 and curler 17 to shape the blank *x*, Fig. 7, into the form shown at *x*, Fig. 8. These bending operations are performed upon succeeding links by succeeding bending devices and the depressions in the bending-block co-operate in giving the desired conformation to the loops 23.

In order that there may be no lateral disarrangement of the partially-formed links, I provide a guide-block Q, which has a gate R, through which the bending projection 16, curler 17, and shaper 18 enter to perform their

functions. This guide-block has dowel-pins 25, which fit within holes 26 in the block N and similar holes (not shown) in the bed-plate D, so as to be capable of a free vertical play, and a flat spring *q* (shown in dotted lines at Fig. 10 and in solid lines at Fig. 3) bears upon the top of said block Q to keep the latter normally depressed. Within this guide-block and extending longitudinally through the same are guideways *r*, within which the wide end of the blank fits snugly, so that during the operations on the blanks *w*, *x*, and *y* the latter are held as against any lateral or vertical displacement. When the chain is advanced by the action of the sprocket P, the links *w*, *x*, and *y* will ride up the inclined floors of the depressions *l*, *m*, and *n*, and thereby raise the block Q against the resiliency of the spring *q*, and when the chain has been advanced to the proper limit said spring will depress the block to normal position, and thereby effect the proper arrangement of the blanks within succeeding depressions in the bending-block. At the opposite ends of the bed-plate D are standards S, within which short shafts *s* are journaled, and on the front ends of these shafts are mounted ratchets T, while on the rear ends sprockets P, hereinbefore referred to, are secured. Pawls U are pivoted to the gate-block E, and springs *t* bear against these pawls on the inside. When the gate-block descends, the pawls engage the ratchets and operate them to revolve the sprockets P in the usual manner. Detents *u* engage the ratchet-teeth to prevent accidental movement in a direction reverse to that effected by the operation of the pawls U. The sprockets P revolve within the feed-channels *i* and engage with the links through the eyes thereof, and the intermittent rotation imparted to said sprockets by the action of the pawls U as the gate-block E descends effects the step-by-step pulling or advancing of the chain, for the purposes hereinbefore set forth.

The arrangement of the pawls U and ratchets T is such that they operate to feed the chain during the downward movement of the gate-block and immediately prior to the operation of the bending devices.

I claim—

1. In a machine for automatically manufacturing chain from sheet metal, the combination of means for feeding the metal strip, instrumentalities for blanking out the links and depositing them within well-like receptacles, instrumentalities for intermittingly feeding the blanks in opposite directions to separate bending devices and threading the shanks of succeeding blanks within the eyes of preceding blanks, devices for bending and shaping the interlooped blanks into the form of a chain, and means for advancing the chain step by step, whereby the links are operated upon by the several bending devices, substantially as set forth.

2. In a machine for simultaneously manufacturing two sheet-metal chains, the combination of the die-block having wells adapted to receive separate series of blanks, one series arranged reversely to the other, the two separate sets of bending devices on opposite sides of said block, the two push-fingers adapted to intermittingly feed the blanks of each series to said bending devices, and means controlled and operated by the press-gate for actuating said fingers, substantially as shown and set forth.

3. In a machine for manufacturing two sheet-metal chains automatically by the same machine, the combination of instrumentalities for forming the link-blanks in two reversely-arranged series from a single strip of metal, means for feeding the blanks of each series in opposite directions to the point at which they are to be connected with each other, instrumentalities for successively threading the shanks of each series of blanks through the eyes of previously-bent and partially-formed links, and instrumentalities for subsequently completely shaping the links of each series and forming the separate chains, substantially as shown and described.

4. As an improvement in machines for automatically manufacturing sheet-metal chain, the hereinbefore-described means for adjusting a flat blank in a previously partially-formed link, which consists in devices for feeding forward the flat blank-eye end first to a point where it will drop by gravity over the partially-formed and vertically-extending shank of the preceding blank, substantially as set forth.

5. The combination of the flat link-feeding mechanism, the bending-block provided with depressions, and the bender having depending projections adapted to co-operate with said depressions to form the finished chain, substantially as set forth.

6. The combination of the bender and the bending-block with the resilient guide-block surmounting said bending-block, substantially as set forth.

7. The combination of the bending-block having raised ears shouldered on the inside with the flat link-bending devices adapted to deposit the links between said ears, substantially as set forth.

8. The combination of the bending-block having depressions *j k l m* with the bender having projections 14 15 16, and pivoted curler 17, having tapered nose and normally distended from the projection 16 by a spring, substantially as set forth.

9. The combination of the bending-block having depressions, the bending devices for shaping the links in conformation to said depressions, the guide-block over the bending-block, having a resilient vertical play and provided with longitudinal guideway for the wide portion of the links, whereby the latter are held as against sidewise or vertical movement, and means for advancing the chain step by step after each bending operation, substantially as set forth.

10. The combination of the push-finger having a stud at the rear end, the reciprocating push-bar, and the spring secured to said bar and having in its free end a socket engaging with said stud, substantially as set forth.

11. The hereinbefore-described improvement in machines for manufacturing sheet-metal chain from blanks having at one end a headed shank and at the other a notched eye, which consists in the combination of devices for bending the shanks into a horizontal plane, so that the heads overhang the notched eyes, with automatically-operated devices for curling said studs to form loops and interlocking the heads with the notches in the eyes, substantially as set forth.

12. The combination of the bending-block having inclined depressions *m*, within which the links are advanced after the shanks have been bent to a horizontal position, the bending device 16, adapted to back up said links at the rear of the bent portion, the pivoted curler having a beveled nose, and the spring whereby said curler is normally distended from the bending device 16, substantially as shown and described.

13. In a machine for automatically manufacturing sheet-metal chains, the combination of instrumentalities for feeding the blanks in opposite directions to the bending devices and threading the shanks of succeeding blanks within the eyes of preceding blanks, separate devices for bending and shaping the interlooped blanks into the form of separate chains, and means for advancing the chains step by step in opposite directions, whereby the links are operated upon by the two sets of bending devices, substantially as set forth.

In testimony whereof I affix my signature in presence of two witnesses.

FREDERICK EGGE.

Witnesses:

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F. W. SMITH, Jr.