3 Sheets—Sheet 1.

L. TOWNE.

Machine for Making Ornamental Chains.

No. 18,490. Patented Oct. 20, 1857.

Fig. 2.

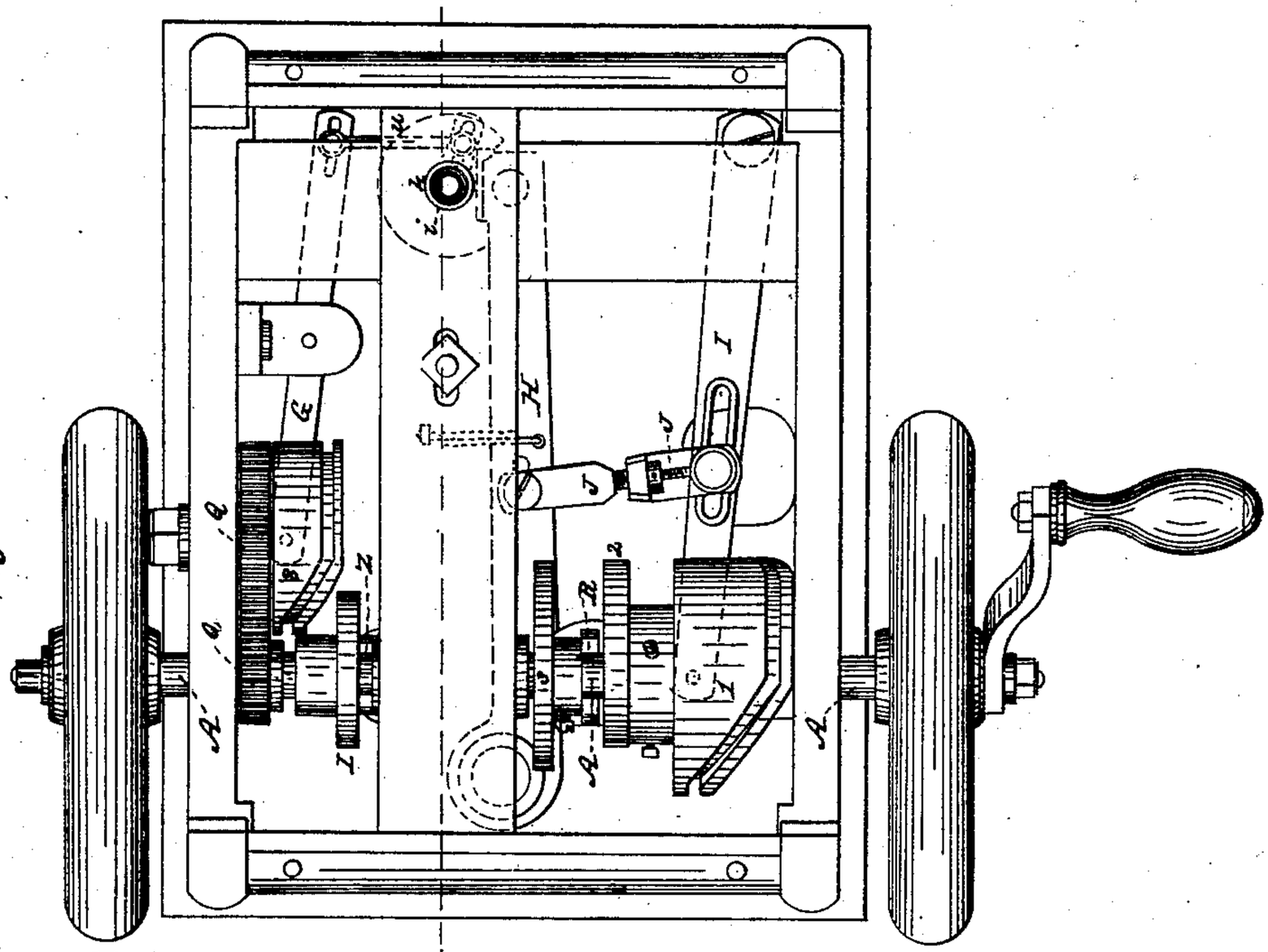

Fig. 1.

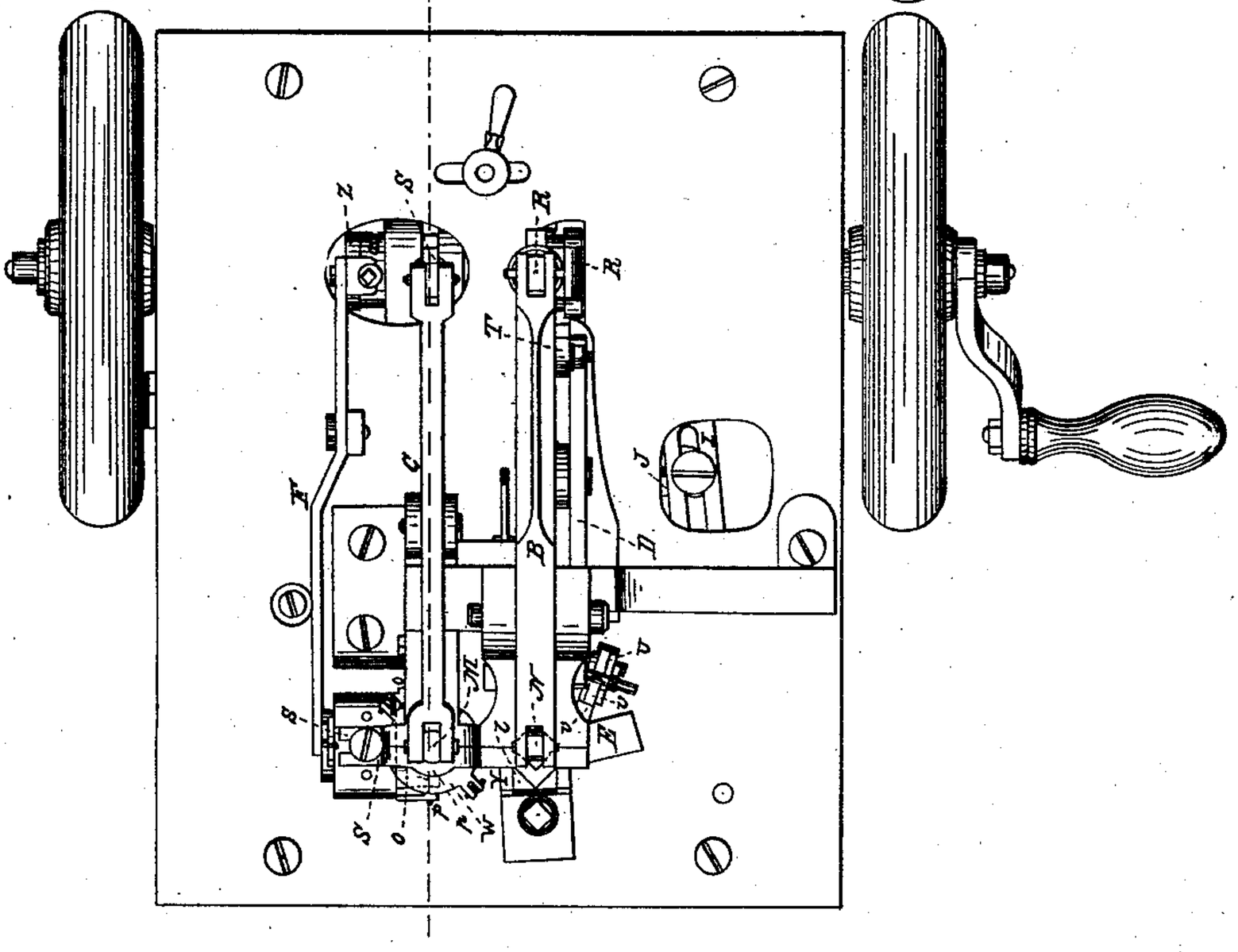

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Fig. 4.

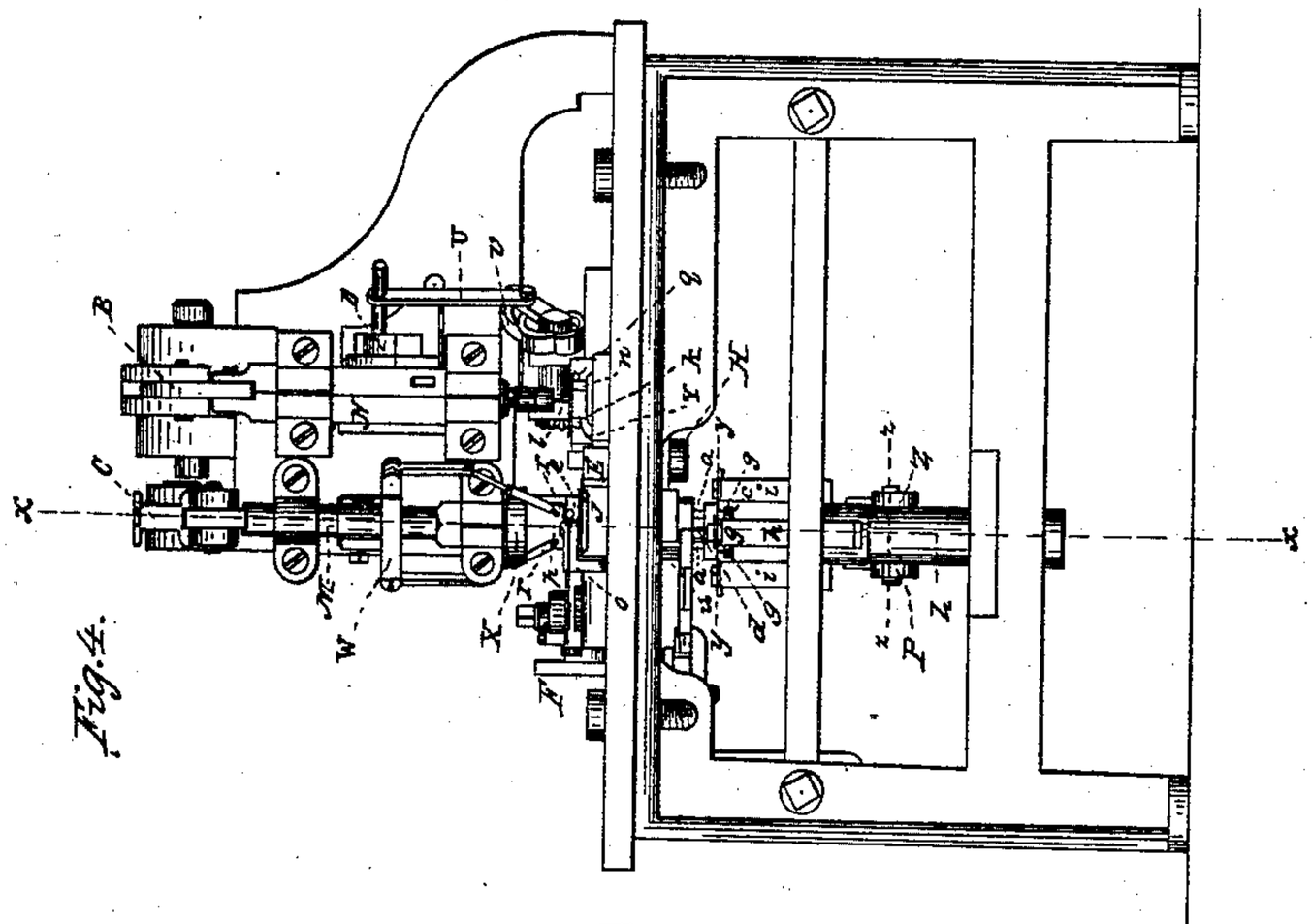
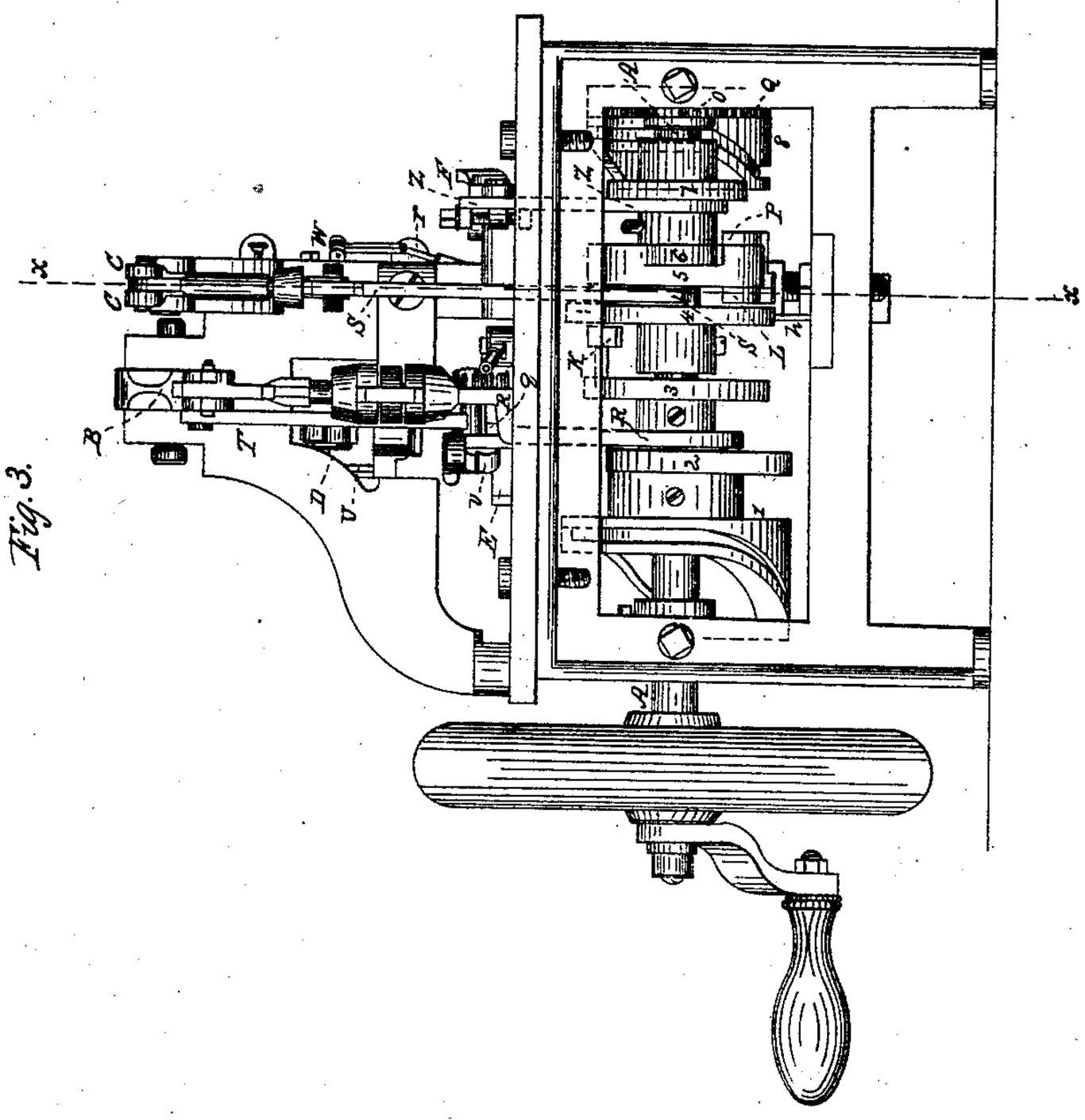


Fig. 3.



3 Sheets—Sheet 3.

L. TOWNE.

Machine for Making Ornamental Chains.

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Fig. 5.

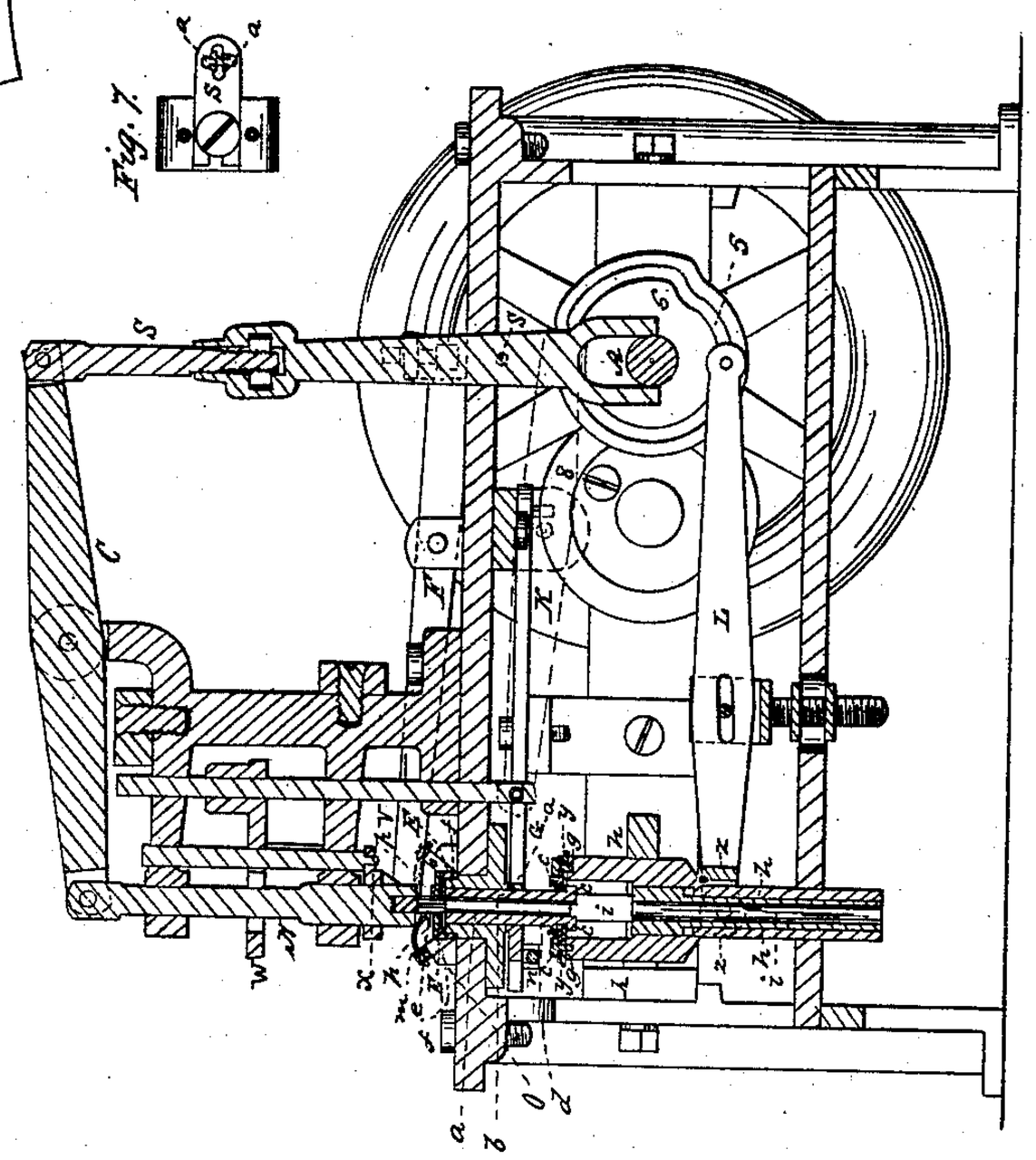

Fig. 6.

Fig. 7.

Fig. 8.

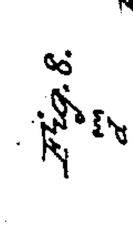

Fig. 9.

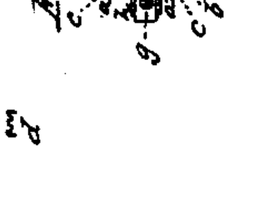

Fig. 10.

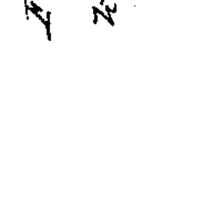

Fig. 11.

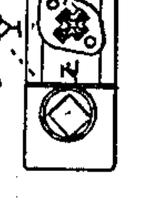

Fig. 12.

Fig. 13.

Fig. 14.

Fig. 15.

UNITED STATES PATENT OFFICE.

LAURISTON TOWNE, OF PROVIDENCE, RHODE ISLAND.

CHAIN-MACHINE.

Specification forming part of Letters Patent No. 18,490, dated October 20, 1857; Reissued March 13, 1860, No. 928.

To all whom it may concern:

Be it known that I, LAURISTON TOWNE, of Providence. in the county of Providence and State of Rhode Island, have invented a new and Improved Machine for Making Chains, Particularly for Articles of Jewelry; and I do hereby declare that the following is a full and exact description thereof, reference being had to the accompanying drawings, making part of this specification, Figure 1 being a plan of the machine; Fig. 2, a plan of the under side thereof; Fig. 3, a rear elevation; Fig. 4, a front elevation; Fig. 5, a vertical section in the plane indicated by the line *x x*, Figs. 1, 2, 3, and 4; Fig. 9, section in the plane *y*, *y*, Figs. 4 and 5; Fig. 10, section in the plane *z*, *z*, Figs. 4, and 5; Figs. 6, 7, 11, 12, 13, 14, and 15, views of parts detached.

Like letters designate corresponding parts in all the figures.

The functions performed by the machine include the whole process of cutting the links from the strips of metal, and their subsequent bending and uniting till the complete chain is formed, without the assistance or intervention of any manipulation.

All the working parts of the machine are mounted in a suitable frame, which is clearly represented in the drawings and needs no description. The movements are accomplished by the action of cams situated upon the driving shaft A, except the cam 8, which requiring to act only half as often as the other cams, is situated on a separate shaft, on which is a cog-wheel Q, gearing into a pinion *o*, of one half its size, on the main shaft. The main shaft may be driven by power or by hand; and is provided with suitable fly wheels to give steadiness to the motions. From the cams suitable connecting rods and levers communicate the desired motions to the proper parts, as hereinafter set forth.

The links are cut from strips of the metal previously prepared for the purpose, and fed in over the die *k*, which is secured in an adjustable seat Y, arranged as shown in Figs. 1, 4, and 11. The cap *l*, covers the die and holds the strips of metal in position while the cutter *n*, is rising out thereof. The strips are drawn over the die by means of rollers *q*, *q*, which are kept in motion by means of the ratchet-wheel and pawl *v*, acting through the vibrating lever D, and connecting rods T, U, by the lever B.

The cutter or punch *n*, is situated in the lower end of a sliding rod N, to which a reciprocating motion is communicated by the vibrating lever B, the movement being imparted thereto by the rod R, connecting with the cam 2, on the driving shaft.

Beneath the die *k*, is situated a vibrating block E, which I denominate the "carrier." This carrier receives each link as soon as it is formed by the cutter and die, *n*, *k*, and conveys it to the part of the machine where the chain is formed. The proper vibratory motion is imparted to the carrier by the vibrating arm H, which receives its motion, through the connecting rod J, from the arm I, the latter being actuated by the cam 1; the whole being arranged substantially as shown in Fig. 2.

Instead of cutting the links from the strips of metal, and depositing them immediately in the carrier, they may be formed in a separate machine, and fed into the carrier, by means of a suitable stack, or feeding tube.

The form of each link is indicated in Fig. 14, which represents the end of the punch or cutter *n*, whereby the link is formed. It has four radial arms which extend outward at right angles to one another, and terminate, at equal distances from the center, in widened extremities in the form of a cross, substantially as shown. The number of arms in each link is not essential; but the links always produce a chain of polygonal form, the number of sides or faces being double that of the arms in each link. Hence, links of four arms produce a chain of eight sides; those of three arms produce chains of six sides; and thus in the same ratio for any number of arms.

The carrier E, has a die or forming aperture, *j*, the arms of which are just wide enough to allow the arms of the link to pass through, but are shorter than the arms of the link, so that when the punch *m*, which is of the form shown in Fig. 15, its arms having no cross-ends like the links, and reaching not quite to the cross-ends of the links, is driven down through the carrier, the said cross-ends of the links are bent up-

ward at right-angles, and drawn edgewise down through the widened extremities of the apertures of the die *j*, the bends being just inside of the cross-ends of the links, as shown in Fig. 8, which represents a side view of a link after being thus driven down through the carrier. In order to keep the links in the proper place on the carrier while it is passing from one position to the other, it has a slight circular spring *e*, arranged as shown in Fig. 6, said spring being of such a size that as the links are driven down upon the carrier, its two sides are separated a very little, and thus press against the edges of the links sufficiently to hold them exactly in the right position.

The punch *m*, which performs both the operations above described and a succeeding one (presently to be described,) in the construction of each link, has two double reciprocating movements imparted to it at each revolution of the driving shaft, by means of a double cam 4, actuating a rod S, and thence through the vibrating lever C, communicating the motion to the punch rod M, substantially as represented in the drawings.

Directly under the punch *m*, is situated the forming guide, the construction and operation of which are as follows: It is composed, as represented in the drawings, of a tube *d*, having an aperture *h*, of sufficient diameter to receive the full-formed chain, extending lengthwise through its center, and provided with a set of slides *a*, *a* and equal in number to the number of sides on the chain, and located in radial notches at uniform angles or distances apart substantially as represented in Figs. 5, 9, and 12. These slides are of the form shown in Fig. 13, the upper ends thereof reaching inward to the aperture of the tube *d*, but the remainder of their length reaching not quite into said aperture, so as to leave a portion of the substance of the tube inside, to keep it whole. On the outer edge of each slide, at the lower end, are projections *c*, *c*, with a notch between them, for the reception of projecting plates or lifters *g*, *g*, (Figs. 5, and 9,) whereby a vertical reciprocating motion is given to each slide to the extent desired. There are only one half as many of the lifting plates *g*, *g*, as there are slides *a*, *a*, there being one to each alternate slide, as shown in Fig. 9. They are mounted on suitable standards *h*, *h*, and *i*, *i*, the opposite ones being connected and moved together but separate from the alternate ones. Thus, for convenience, the standards *h*, *h*, are united to, or compose, a tube, or its equivalent, at the bottom; while the other opposite standards *i*, *i*, are united to, or form another tube, the one being represented in the drawings as within the other. The standards *h*, *h*, receive their reciprocating movement from a lever L, which is vibrated by a cam 5; and the standards *i*, *i*, are in like manner moved by a lever P, which is actuated by a cam 6. The cam 5, begins to operate a little sooner than the cam 6, as shown in Fig. 5, but ceases its action nearly or exactly at the same time; so that the slides moved by the one set of lifters, rise a little before those moved by the other set.

The forming-guide tube *d*, is connected by a rod *u*, with a vibrating lever G, to which a vibratory motion is given by the cam 8. Since said cam revolves only half as often as the other cams, there is only a half vibratory movement, or a vibratory movement in only one direction, for each link. The extent of vibratory motion thus given to the tube *d*, on its axis, should be equal to the angular distance between two adjacent slides *a*, *a;* as, for instance, if there are eight slides, the angular vibratory movement of the tube should be one-eighth of a circle, or 45 degrees. The effect of this arrangement and movement of the forming guide is to cause one-half only of the slides *a*, *a*, to be raised and lowered by each movement of the standards *h*, *h*, and *i*, *i;* and the next time to raise and lower the alternate, intervening slides. For, as is seen in Fig. 9, the lifters *g*, *g*, *g*, *g*, only touch the alternate slides, which in the succeeding movement of the standards, take the positions of the intervening slides, while the latter assume the positions of the former, and are in their turn acted upon.

Instead of the tube *d*, any equivalent device which can serve as a sustaining guide and receive the movements imparted thereto, may be employed; as, for instance, a ring, or a plate with a central perforation for the passage of the chain. And, instead of the reciprocating slides *a*, *a*, &c., vibratory arms, or pins, having vibratory motions or pivots, may be used to accomplish the same purpose; or any other equivalent and convenient arrangement may be adopted. But the arrangement described is convenient and effectual. Also, a revolving angular movement of the tube may be substituted for the vibratory movement above described, the object being to cause the arms of the successive links composing the chain to interlock, or lie alternately.

The slides *a*, *a*, when in their lowest positions reach nearly or exactly to the top of the tube *d;* and their inner, upper corners are rounded as shown in Figs. 5, and 13, so that their action upon the links may be smooth as well as effectual. Between the slides, and close to the central aperture *b*, small projections *f*, *f*, &c. (Figs. 5, and 12,) extend upward from the tube a little above the slides, for the purpose of retaining the links in their proper positions when placed upon the forming guide as above described.

The link is held down thereon during the time in which the carrier is receding and before any other means can be applied for the purpose, by a plate *s*, as shown in Figs. 1, 4, and 5, but most distinctly in Fig. 7. This plate is situated immediately over the forming guide, and has an aperture substantially of the form represented, there being inward projections between which the link *a*, is driven with a slight compression, after its cross-ends are bent up in the form shown in Fig. 8; and as soon as it passes down through the aperture, said cross-ends spring apart a little, and are caught and held beneath said projections of the plate, as shown in Fig. 7.

As soon as the link is deposited in the position above specified, the carrier retreats to the position for receiving another link; and two or more slender rods or pins *r*, *r*, are caused to descend and bear upon the link. These rods slide in a holder X, so as to converge in their descent; and their motion is imparted by the cam 3, through a vibrating lever K, sliding rod V, and arm or plate W, with which the rods are connected by intermediate links, or hinged rods, all substantially as shown in the drawings. The upper link being thus held down, the next movement is the ascent of two of the slides *a*, *a*, caused by the action of the cam 5, through the lever L, on the standards *h*, *h*. This movement bends two arms of the upper link but one (the arms of the upper, or last link, being over the alternate slides which are not put in motion,) upward and partially inward over the link above. While the said slides are still up, a curved finger or pin *p*, is moved or vibrated inward and downward over, and close to, each slide till it strikes the end of the link-arm beneath, and presses or clenches it closely down upon the link below. These fingers *p*, *p*, are mounted in vibratory arms *o*, *o*, to which the proper motions are communicated by a vibratory lever F, and connecting rod Z, from the cam 7, on the driving shaft.

Before the fingers *p*, *p*, are withdrawn from the link, the two slides *a*, *a*, beneath the remaining arms of the link are raised, and bend said arms upward and inward toward the center. The fingers *p*, *p*, are then withdrawn. The holders *r*, *r*, are also withdrawn at or before this time. At this moment, the arms of the second link are bent up over the top link; and the two lower arms are pressed closely down thereon, while the two upper or last-bent arms still remain but partially closed down upon the others. The punch *m*, now again descends and clenches these upper arms close by down upon the others, and completes the formation of the link; at the same time forcing the whole chain down, to give place for the succeeding operation. The carrier then comes forward with another link; and the angular motion is given to the forming guide below, in order to cause the arms of the succeeding link to alternate with those of the upper link of the chain. The movements above described are then repeated.

Instead of moving the forming guide, with the chain, only a distance equal to the angular space occupied by each face of the chain, it might be moved three, five, or any uneven number of times that distance, so as to accomplish the alternation of the arms of the successive links. This is suggested not because it would be preferable to, or even so well as, the simple method described, but to indicate a possible modification thereof.

The machine, as above described, is arranged so as to turn, or vibrate, the chain to receive the links in alternate positions, for interlocking the arms thereof. Instead of thus turning or vibrating the chain, the links might be applied in alternate positions, while the chain would remain in a fixed position. This method would require the angular vibration or turning of the link-carrier, or its equivalent, the punch *m*, the lifters *g*, *g*, and fingers *p*, *p*; or if not the actual movement of all or any of them, a double number alternately put in action would be required. Such an arrangement would be more complicated, more difficult to arrange, and less desirable in many respects, than the method of moving the forming guide and chain; but it is the same in principle as, and can be considered only as a modification of, the method adopted and described.

The several levers, or their connecting rods, which transmit the motions from the cams, are provided with suitable adjustments, substantially as represented, for the purpose of accurately adjusting all the movements with the utmost precision. The same machine will make chains of different sizes, by simply employing dies, punches, &c., on which the size of the links depend, to produce the dimensions required.

What I claim as my invention and desire to secure by Letters Patent, is—

1. The forming guide, for holding and transmitting the chain during the formation thereof, constructed and arranged as described, or in any other manner which will enable it to perform substantially the same functions.

2. I also claim giving to the forming guide an angular movement upon its axis, so as to present the chain to the successive links in such positions that the arms thereof will alternately interlock.

3. I also claim the double movement of the punch *m*, first, to give the outer bends to the links while depositing them upon the forming guide, and second, to finally clench

them, and force the chain downward to make room for the succeeding links, substantially as herein specified.

4. I also claim the arrangement and combination of the carrier E, die *m*, and the forming guide, or their equivalents, so as to first bend the links inward near the extremities of the arms, and afterward to make the bends nearer the center of the links, for the purpose specified.

5. I also claim the slender, converging rods, or holders, *r*, *r*, for holding down the top link while bending the first pair of arms of the link below, up over it.

6. I also claim the arrangement and operation of the slides *a*, *a*, or their equivalents, substantially as described, so as to bend and clench the arms of each link successively by pairs and cause the succeeding pair or pairs to overlap the preceding ones; or in case the links have an odd number of arms, to cause the succeeding arms of each link to overlap the preceding ones, singly in succession.

7. I also claim the fingers *p*, *p*, operating as described, for the purpose of forcing and holding down the first pair of arms so as to enable the succeeding pair to be lapped over them, substantially as specified.

LAURISTON TOWNE.

Witnesses:
J. S. BROWN,
A. H. KNAPP.

[FIRST PRINTED 1912.]