2 Sheets—Sheet 1

B. HERSHEY.

MACHINES FOR WELDING AND FINISHING CHAIN-LINKS.

No. 193,083. Patented July 17, 1877.

Fig. 1.

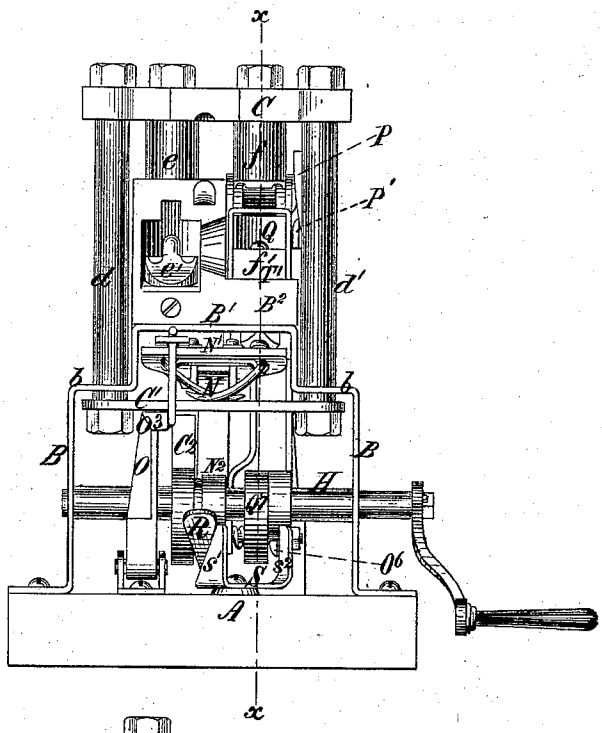
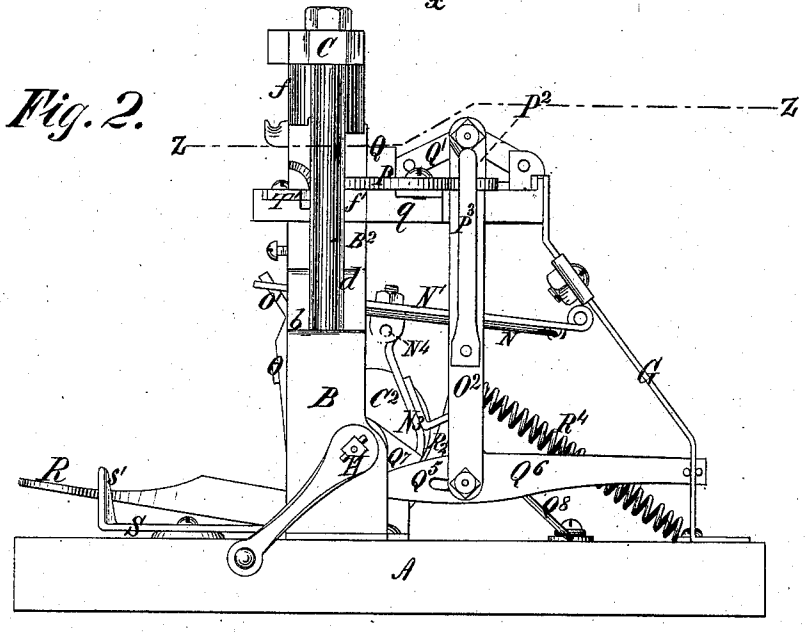


Fig. 2.



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2 Sheets—Sheet 2.

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Fig. 3.

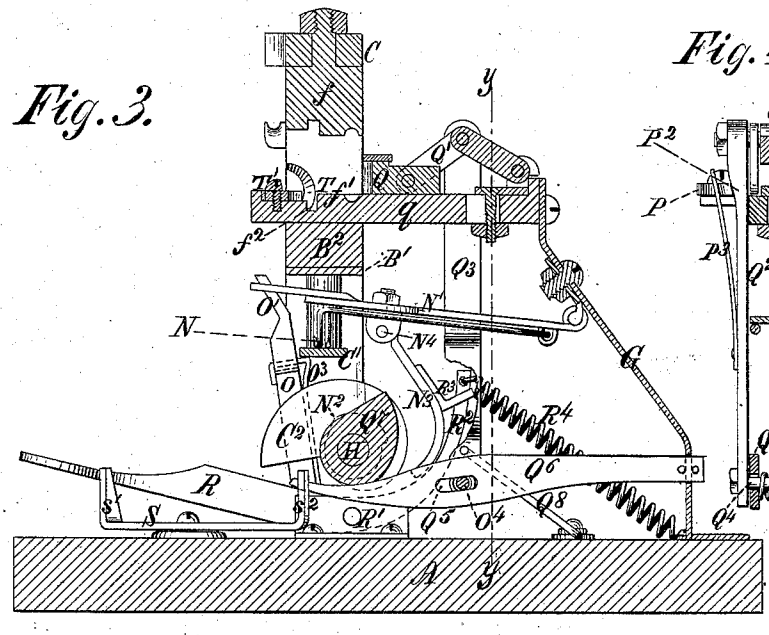
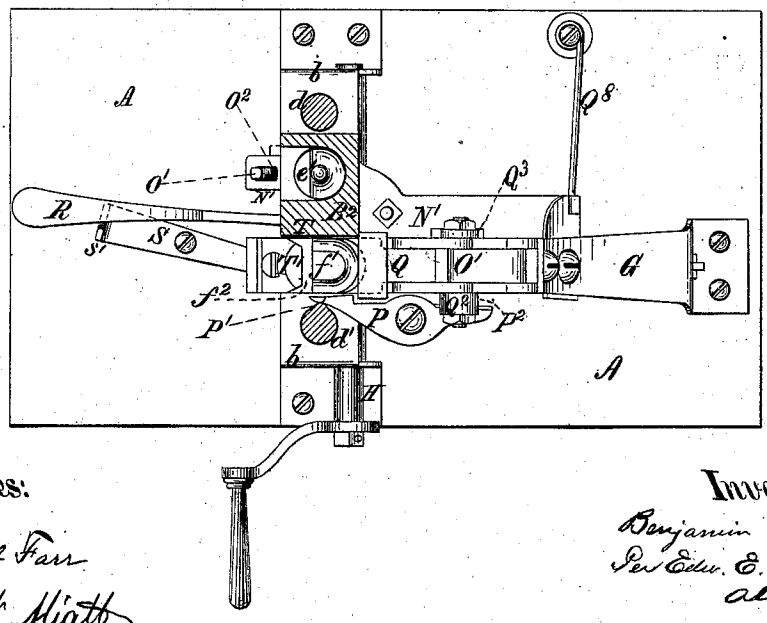


Fig. 4.

Fig. 5.



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UNITED STATES PATENT OFFICE.

BENJAMIN HERSHEY, OF ERIE, ASSIGNOR TO PITTSBURG CHAIN AND CAR LINK MANUFACTURING COMPANY, OF NEW BRIGHTON, PENNSYLVANIA.

IMPROVEMENT IN MACHINES FOR WELDING AND FINISHING CHAIN-LINKS.

Specification forming part of Letters Patent No. **193,083**, dated July 17, 1877; application filed June 20, 1877.

CASE A.

To all whom it may concern:

Be it known that I, BENJAMIN HERSHEY, of Erie, Pennsylvania, have invented certain Improvements in Machines for Welding and Finishing Chain-Links, of which the following is a specification:

My improvements relate to machines for welding and finishing chain-links.

My invention embraces a peculiar system of combined swaging and compressing dies for giving the final form to a chain-link after it has been welded in swaging-dies resembling those described in the Letters Patent of the United States No. 166,372, issued to me as assignor, &c., August 3, 1875.

My invention also consists in the peculiar organization of the machine, in which the welding-dies and my new finishing-dies are combined, as a result of which the machine is simplified in construction, and its convenience of operation is greatly facilitated.

The accompanying drawings are as follows: Figure 1 is a front elevation of the machine, showing the drop frame or gate which carries the drop-dies in the elevated position which it assumes, and in which it is sustained by a stop when the parts are thrown out of engagement with the cams on the driving-shaft. Fig. 2 is an elevation on the side where the power is applied. Fig. 3 is a longitudinal vertical section through the line *x x* on Fig. 1. Fig. 4 is a transverse longitudinal section through the line *y y* on Fig. 3, showing the toggle-joint for reciprocating the endwise-compressing die Q. Fig. 5 is a longitudinal section of the machine through the line *z z* on Fig. 2.

Referring to the drawings, it will be seen that the bed-plate A affords support for the upright frame, consisting of the standards B B and the cross-piece B^1.

The standards B B are provided with horizontal bearings for the cam-shaft H, and have, near the top, offsets *b b*, which afford vertical bearings for the gate-bars *d* and *d'*.

The gate is composed of the vertical bars *d* and *d'*, which are bolted at the top to the cross-piece C, to which the swaging-dies *e* and *f* are secured. At the lower ends the gate-bars *d* and *d'* are bolted to the cross-piece C^1, which receives the thrust of the lifting-cam C^2, which operates to raise the gate preparatory to letting the drop-dies *e* and *f* fall upon the stationary dies *e'* and f^1.

The stationary dies are screwed to the die-holder B^2, which is supported upon the cross-piece B^1 of the frame. Torsion-springs N are introduced above the cross-piece C^1 of the gate, for the purpose of giving additional force to the gate in its downward movement.

The stop-lever O is pivoted at its lower end to the bed-plate A. Its upper end is bent outward, as shown at O^1, Fig. 3, and passes through a slotted opening, O^2, in the hinged plate N^1, to the under side of which the torsion-springs N are affixed.

By the upward movement of the plate N^1 the upper end O^1 of the stop-lever is pulled toward the gate, and a spring-latch, O^3, is thus brought under the cross-piece C^1, and prevents the descent of the gate when the machine is not in use.

In the general arrangement of the parts so far referred to, the machine in its organization resembles that shown and described in the Letters Patent No. 166,373, granted to me August 3, 1875.

In the present machine, however, I provide two sets of dies—welding-dies and finishing-dies. The welding-dies are composed of the swaging-die *e* and the stationary die *e'*, and are substantially like those heretofore used by me, and described in my various Letters Patent.

The finishing-dies *f* and f^1 act in conjunction with the compressing-dies, by the operation of which the link, at the instant before it is struck by the drop-die *f*, is compressed both endwise and sidewise. The sidewise compression of the link is imparted by the rocking die P, one end of which is forced toward the die by the wedge P^1, affixed to the side of the gate-bar *d'*, while, at the same time, the opposite end of the rocker P is pressed outward by the wedge P^2 on the side of the pitman Q^2. A spring, P^3, holds the inner end of the rocker P against the side of the pitman Q^2 and wedge P^2. The endwise compression of the link is effected by the reciprocating con-

cave-faced die Q, which is operated by the toggle-joint Q^1. The necessary movement to the toggle-joint is given by means of two parallel pitmen, Q^2 and Q^3, which are pinned together at their lower ends by the pin Q^4, which passes through the slot Q^5 in the cam-lever Q^6. This cam-lever is pivoted to the rear standard G, which is affixed to the bed-plate at the rear of the machine, and which is bent inward, and at its upper end affords a support to the bed *q*, upon which the toggle-joint Q^1 and the compressing-die Q are supported.

The toggle-pitmen Q^2 Q^3 are pulled downward by the action of the cam-lever Q^6; but when the cam-lever Q^6 is released from the cam Q^7, the toggle-pitman is thrown upward (thus withdrawing the die Q) by the action of the torsion-spring Q^8, one end of which is affixed to the bed-plate A, while the other end engages the pitman Q^3.

The cam-lever Q^6 is capable of a slight lateral motion, so that when not in use it can be thrown out of gear with the cam by the action of the spiral spring Q^9 on the pin Q^4.

The torsion-springs N are secured on the under side of the plate N^1, the rear end of which is pivoted to the back standard G. The spring-plate N^1 is pulled downward when the machine is in operation by the cam N^2 acting upon the crooked arm N^3, which is secured to the spring-plate N^1 by the pivot N^4. The spring-plate arm N^3 is pulled forward into position to be acted upon by the cam N^2 by means of the foot-lever R, which is hung upon the pivot R^1, immediately under the cam-shaft H.

The back end R^2 of the foot-lever is bent upward, and passes through an eye or slot in the plate R^3, which is secured to the spring-plate arm N^3.

The spiral spring R^4 is secured to the bed-plate at one end, and to the upper end of the foot-lever R^2, and tends to pull the end R^2 backward, and thus to pull the arm N^3 out of the range of motion of the cam N^2.

When the outer end of the foot-lever R is pushed downward the side of the foot-lever acts upon the inclined side of the end s^1 of the rocker S, the opposite end of which, s^2, strikes against the side of the cam-lever Q^6, and tends to throw the cam-lever under the cam Q^7, in position to be engaged and forced downward by the cam in its revolution.

It will be seen that in the machine which forms the basis of my present application, which I have designated "Case A," the link, after being welded in the welding-dies, is finished by being subjected to the combined action of swaging-dies and both endwise and sidewise compressing dies.

I have made a separate application, of even date herewith, which I have designated "Case B," for a patent for a chain-link machine in which the preliminary welding operation is dispensed with, the link being welded and finished simultaneously by the combined operation of swaging-dies for welding and an endwise-compressing die, which is deeply recessed, and, by means of its projecting side wings, administers sidewise as well as endwise compression to the link.

In the present case the endwise-compressing die has no projecting side wings, and does not act upon the sides of the link, the sidewise compression being effected by the action of the rocking die P.

In the present case the link is supported against the sidewise thrust of the rocking die P by the opposite wall T of the finishing-die chamber. The link is supported against the thrust of the endwise-compressing die Q by the back rest T′, which is bolted to the front end of the stationary finishing die f^1, and presents a concave shoulder to receive the end of the link. The stationary die f^1 is provided with a transverse slot, f^2, to provide for the reception of the chain-link upon which the link about to be finished is hung.

To operate my machine the foot-lever R is depressed. The downward movement of the foot-lever, acting through the rocker S, throws the cam-lever Q^6 under the cam Q^7, and pulls forward the torsion-spring-plate arm N^3 in position to be acted upon by the cam N^2. The cam N^2, in its revolution acting upon the arm N^3, pulls the torsion spring-plate N^1 down, and compresses the ends of the torsion-spring N upon the cross-piece C^1 of the gate. By the downward movement of the torsion spring-plate N^1 the inner end of the slot O^2, acting upon the inclined upper end O^1 of the stop-lever, pushes the stop-lever outward, and pushes the spring-latch O^3 beyond the plane of movement of the cross-piece C^1, thus permitting the gate to rise and fall with each revolution of the lifting-cam C^2.

The link to be welded is introduced into the welding-dies before the foot-lever is depressed, and after the link has been subjected to the requisite number of blows the foot of the operator is removed from the foot-lever, which rises, and thus permits the stop-lever to act in preventing the further descent of the gate, while the operator removes the link from the welding-dies to the finishing-dies. When this removal has been effected the lever is again depressed, and the drop-die *f* falls upon the link at the instant after the rocking die P has compressed the link sidewise against the wall T of the finishing-die chamber, and the reciprocating die Q has compressed it endwise against the back rest T′.

In making certain sizes of chain it is desirable to have a little extra room in the chamber where the links are welded. I am enabled to have this extra room in my welding-die chamber, because of my provision for the supplementary operation of reducing the link in the finishing-dies to the exact width and length required. The endwise and sidewise compression corrects any expansion of the link which may have been effected by the action of the welding-dies.

My end-compressing die Q performs the further office of compressing those parts of the weld-joint which are not subjected to the direct vertical action of the swaging-dies f and f^1.

I claim as my invention, in an organized machine for welding and finishing chain-links—

1. The series of dies shown and described, consisting of the welding-dies e and e' and the finishing-dies f and f^1, Q, T′, and P, constructed and operating substantially as set forth.

2. The swaging-dies f and f^1, in combination with the endwise-compressing die Q, and the back rest T′, and the sidewise-compressing die P, and the side wall T of the die-chamber.

3. The finishing-dies composed of a supporting or stationary die and the drop-die, in combination with endwise and sidewise compressing dies, substantially as shown and described.

4. The foot-lever R, in combination with a rocker, S, and pivoted arm N^3, for the purposes of throwing the cam-lever Q^6 into position to be acted upon by the toggle-cam Q^7, and simultaneously bringing the arm N^3 into the range of motion of the spring-plate cam N^2, and thus enabling the cam N^2 to depress the spring-plate N^1, and thereby bring the spring N into action, and dislodge the stop-latch O^3 from the under end of the die frame or gate, substantially as set forth.

5. The toggle-cam Q^7, in combination with the pitmen Q^2 and Q^3, the latter provided with the wedge P^2, by the operation of which the toggle-die Q and the rocking die P are simultaneously brought into action, substantially as described.

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