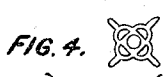
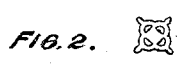
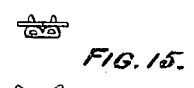
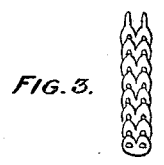
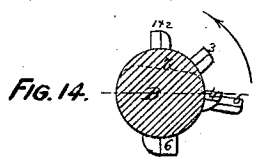
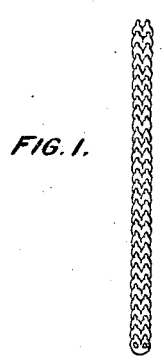
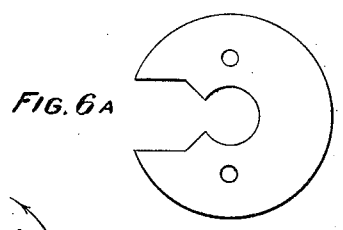
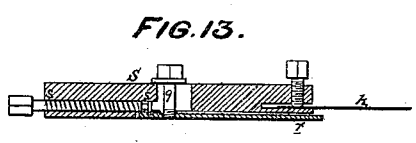
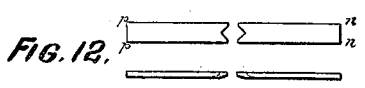
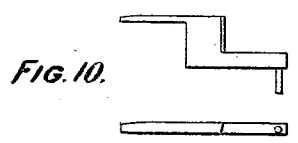
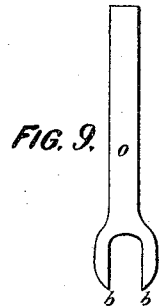
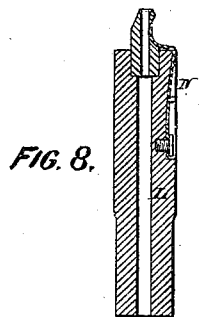
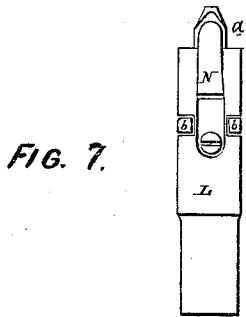


W. BANCROFT & J. WOOD.

Improvement in Machines for Making Ornamental Chains.

No. 132,947.

Patented Nov. 12, 1872.



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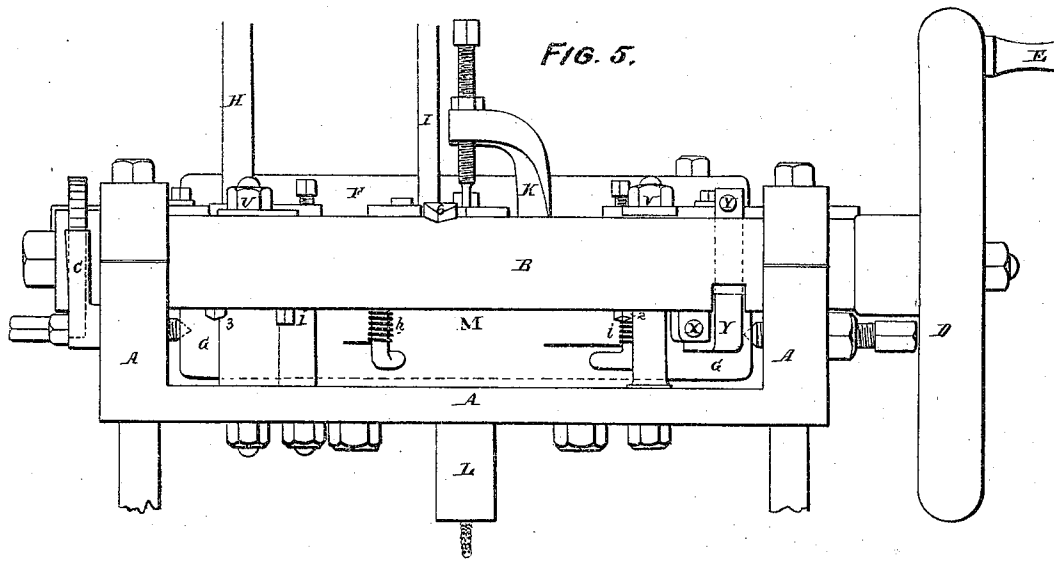
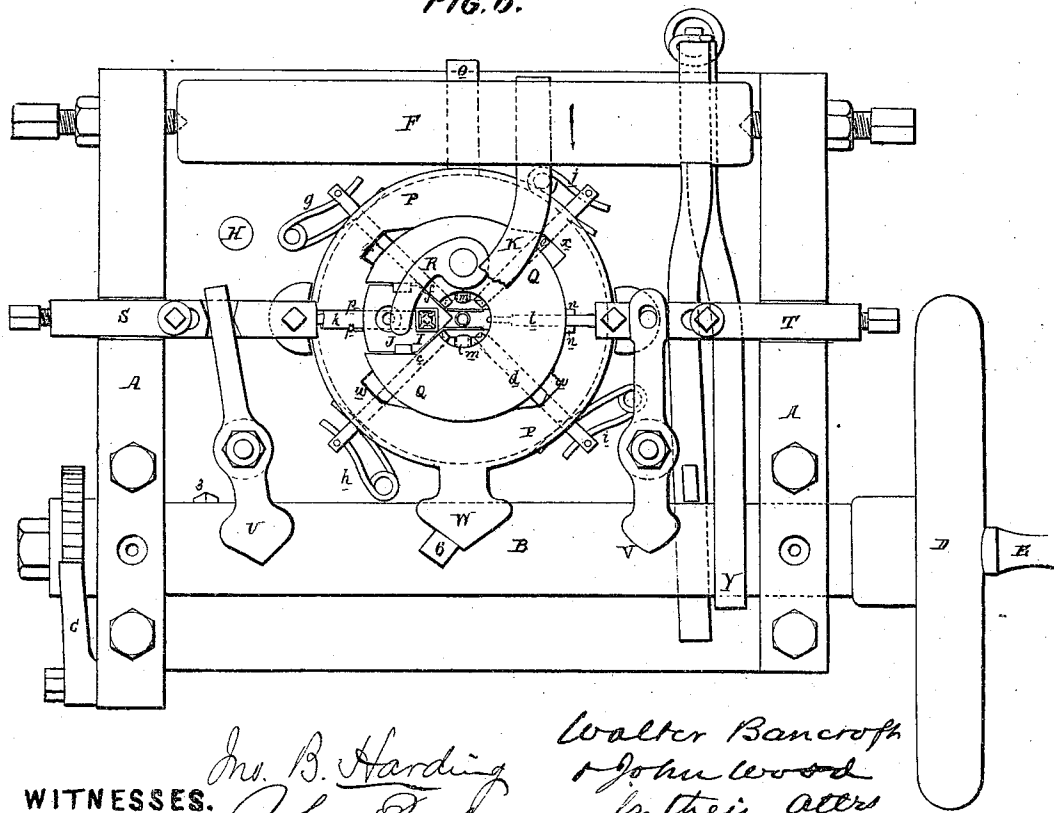


FIG. 6.



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UNITED STATES PATENT OFFICE.

WALTER BANCROFT AND JOHN WOOD, OF BIRMINGHAM, ENGLAND.

IMPROVEMENT IN MACHINES FOR MAKING ORNAMENTAL CHAINS.

Specification forming part of Letters Patent No. 132,947, dated November 12, 1872.

To all whom it may concern:

Be it known that we, WALTER BANCROFT and JOHN WOOD, both of Birmingham, in the county of Warwick, England, have invented certain Improvements in the Manufacture of Ornamental Metallic Chains and in certain appliances for producing the same, of which the following is a specification:

Our invention has for its object the manufacturing of fancy watch, neck, and other chains of various shapes, in transverse section, and facilities for linking or uniting the parts together forming the chain, and we will describe our improvements as relating to the manufacture of a round ornamental chain, which we produce from thin sheet metal, cut and pierced of a suitable size and shape, the radial distance of the pierce-holes from the center being within the circumference of the intended chain; and opposite the pierce-holes (adopting by preference four in number) we form radial projections, the form of the metal, from projection to projection, being of any ornamental shape. Blanks of thin metal thus formed we place in a suitable receiver connected with our improved apparatus, which in working advances a blank over a sunken cavity into which it is pressed into a cup-like shape by a descending press-tool, causing the projections of the blank to stand up vertically in the right position to enter the pierced holes on the following or succeeding blank; and this we effect by lateral slides, so that in the process of making up the chain the portions of the projections entering the slots will be bent inward and flattened down over the blank or link last advanced by radial slides advancing toward the center, while, by the continuation of the revolving motion of the main or cam shaft, the forming-tool is made to descend and the radial slides to retire to give space for the next link to be advanced in rotation, and so on until a sufficient number of links are united together to produce a chain of the desired length, or to be continued in long lengths for dividing up, as required. The mode of actuating the top punch or forming-tool, lateral slides, and other motions, may be by a handle on the cam-shaft, or by auxiliary power, and in all cases unskilled labor may be employed simply for working or superintending the working of the machine.

Other shaped chains than round are produced in like manner by the form of the blanks and tools being modified and set accordingly; but, with a view of avoiding multiplicity of design, we will restrict our description to one pattern, in two sizes, as exhibited in the drawing hereunto annexed, which we will proceed to describe, Figure 1 representing the chain worked up from blanks, as represented at Fig. 2, which blank will be hereafter referred to on describing the apparatus. Figs. 3 and 4 represent the same description of chain in larger sizes.

The manner in which we proceed to produce this description of chain is as follows, reference being had to the drawing—that is to say, by a compound-action press, whether worked by hand and fly-treadle motion, or auxiliary power, we cut out and pierce the blanks, as exhibited at Figs. 2 and 4, a species of working well understood by skilled artisans accustomed to the operation of press-tools for cutting out and piercing thin metal. As these blanks are being cut and pierced or otherwise operated on they drop into a hopper or tube, which possesses the quality of holding and keeping them in position for use, the tube being square or other sided to take the angular projections of the blank, and when the hopper or receiver is sufficiently filled with blanks it is removed from the cutting-out apparatus (not shown in the drawing) and placed in such a position that the blanks may be successively removed and worked into a chain in the following way: Figs. 5 and 6 represent a side and top view of our improved apparatus for the working up of blanks into chain, and consists of a cast-iron or other stand, marked A. The ends, standing up at right angles from the base, provide bearings for the main shaft, marked B, which carries the various cams. The shaft B is fitted with a ratchet and pawl, marked C, at one end to prevent the shaft B being turned in the wrong direction, while the other end of the shaft is fitted with a hand-wheel, marked D, to which is attached the handle E, by which motion is given to the apparatus; notwithstanding, the shaft B may have fitted fast and loose pulleys in place of the hand-wheel and handle if it should be found necessary to work such apparatus by auxiliary power, and in like manner between the angular end projections of the stand A

rocking-shafts are placed and adjusted between set-centers. The rocking-shafts are two in number—one immediately below the other. The top one is marked F, the bottom one, partly seen in Fig. 5, is marked G. The circle marked H in the top view, and by the same letter in the front view, Fig. 5, represents a standard broken off for convenience of space, which in use extends up sufficiently high to support the hopper or receiver, marked I, for holding the blanks, which is also broken off for convenience of space. This hopper or receiver is held freely at the top by a bent arm of the standard, while at the bottom it passes through a square orifice formed through the part marked J, which has no motion in itself, while the apparatus is at work. In Fig. 6 we have broken off the rock-lever that gives motion to the heading-tool to avoid confusion, but the lever in both views is marked with the same letter, K. The heading-tool in this case is screwed through the end of the lever and set in position by a lock-nut; notwithstanding, for some patterns of chains, where the blanks have to be raised deep in form, we purpose causing the heading or forming tool to work perfectly vertical by the action of the rocking-lever instead of working in a curve, as here shown. Centrally between the ends of the bed ℓ circular boss is fixed, partly shown in Fig. 5, marked M, for carrying the various tools and operating devices constituting our improvements. In the center of this boss a vertical hollow concentric-bed tool is fitted, shown in a side and sectional view marked L in Figs. 7 and 8. The central orifice is slightly contracted by a steel nose, marked *a*, which nose is partly cut away on the one side to give a bearing to the spring N. The part removed from the nose piece permits the upper end of the spring to slightly project inward over the circumference of the orifice, the object of which will be hereafter referred to. The bed-tool L is made to rise and fall by a forked lever attached to the lower rocking shaft G, which lever is partly represented at Fig. 6, marked O, and detached at Fig. 9, the forked end being shown in Fig. 7, marked *b b*. On the top of the circular boss M an annular steel flat ring is placed, the boss projecting beyond its surface, filling up the inner cavity, as seen in Fig. 6, the annular ring being marked P P, and the central projection Q Q. The part Q is divided at right angles with grooves and slides, as at *c*, *d*, *e*, and *f*, one of which is shown detached in side and edge views at Fig. 10. These slides extend out, and are held in radial expansion by coiled-wire springs, marked *g*, *h*, *i*, and *j*; *h* and *i* are partly seen in Fig. 5, and parallel with the cam-shaft, across the center of the circular projection Q Q, is another groove the exact width of the blank to be worked up, such as exhibited in Fig. 2. Working in this parallel groove is the feeding-slide, composed of a thin blade of steel, marked *k*, that advances a blank (from the hopper or receiver) over the central orifice,

which slide passes under the part J, held down by the strap or saddle R; and simultaneous with the advancing of the blank to the center the pointed holder *l* is advanced, the small end of which lies over the blank as it advances to its place to prevent the blank rising. And these working parts we prefer covering over by a plate, exhibited detached at Fig. 6^a, in order to exclude all dust or dirt from the slides and other moving parts. On each side of the circular orifice are bits of hard steel, as exhibited detached at Fig. 11, edges of which are filed under, that as the blank is advanced the upper edges of these parts shall overhang the blank and hold it down to be operated on by the top or forming-tool. These T-pieces partly shown in dotted lines, are marked *m m*. About a sixteenth of an inch below the bed of the parallel groove last described a recess is formed a little wider, by preference, than the parallel groove, in which two slides work, the outer ends of which are here seen marked *n n* and *p p*, and which slides are shown detached in flat and edge views at Fig. 12. The object of these partly-invisible slides will be hereafter referred to. The slide *k*, for advancing the blank and the pointed holder *l*, requiring delicate and positive adjustment, more particularly the former, as well as the advancing of the partly-invisible slides, as exhibited at Fig. 12, render it necessary that means for adjusting these parts should be readily effected, and this we do by constructing the lateral sliding parts S and T in the manner exhibited at Fig. 13, which is a longitudinal section of the slide-holder S, which has a vertical slot through it the width of the thickness of the vertical screw *q*; and along the bottom of this slide-holder is a groove for receiving a thin piece of steel, marked *r r*, the inner end of which, being thickened up, permits a recess to be formed for receiving a projection formed at the end of the screw *s s*, that by turning the screw in or out the part *r* will be advanced or retired. The end of this slide *r* is so adjusted that when the slide-holder *s* is advanced with the attendant parts in the process of working, the extreme end of the part *r* will be brought in contact with the outer end of the partly-hidden slide, shown separate at Fig. 12, marked *p*, and advance it to its work. This auxiliary adjustable slide *r* is held in its place by the screw *q*, and in like manner the slide-holder T is constructed for adjusting the pointed holder *l*, and operating on the partly-hidden slide *n*.

The general details being described we will now put the several parts into action to perform their various and distinct functions in the order of their necessary working, first advancing the blank, cupping it, setting its points in the exact vertical position for entering the pierce-holes in the next advanced blank, the bending inward of the points that have passed through the pierce-holes of the last advanced blank ready for the descent of the cupping or forming tool, and the adjusting

of the points ready for the reception of the next blank in rotation.

To begin the order of the operation of the apparatus the main shaft B should be in position in relation to the various cams projecting from the same, as indicated at Fig. 14, the line passing through the center of the section representing the datum of its starting point. The shaft being turned in the direction of the arrow, lateral arms 1 and 2 operate on the levers U and V, Fig. 6, which advances a blank from the one side and the pointed holder *l* on the other, and by the simultaneous advancing of these slide-holders S and T the adjusting-slides *n n* and *p p*, represented separate at Fig. 12, as before stated, are advanced to their work, cam No. 3 comes into operation, and places the lever U in the position shown in the drawing, thereby retiring the feed-slide K, and next cam 4 operates on the annular ring P by coming in contact with the striking part W, advancing, by the incline planes *w* and *v*, the slides *d* and *f*; and simultaneous with this the projecting cam 5 acts, first, laterally against the right-hand side of the lever V to retire pointed holder *l*, and passes on to perform its next operation, before which cam 6 takes up its duty by coming around into the position shown in the drawing at Figs. 5 and 6, for moving the annular ring P in the reverse direction back to the extent of its throw, which will bring the incline planes *w* and *v* in contact with the ends of the slides *c* and *e* to advance them to their work. As soon as this is effected cam 5 depresses the lever X by its direct eccentric action, causing the top rock-shaft to slightly turn in the direction of the arrow, thereby depressing the cupping or forming tool in connection with the lever K. The next cam in rotation is formed by cutting a groove across the main shaft to the extent indicated by the dotted lines at Fig. 14, marked 7, and by its revolution, just as the cam 5 has done its work, the lever Y is allowed to fall into the recess of the shaft, thereby slightly turning the lower rock-shaft downward, causing the forked lever, as shown and described at Fig. 9, to carry down the central bed, shown separate at Figs. 7 and 8. These two levers, X and Y, have tension-springs applied to their back ends to hold the long ends in contact with the cams. Having now made the revolution of the driving-shaft, we will imagine that cams 1 and 2 have been again brought into action, thereby advancing the blank, which has been permitted to drop from the receiver or hopper down on the bed of the parallel groove, and has been carried forward by the slide *k* over the orifice or center of the apparatus, and simultaneously to advance the pointed holder *l* over the said blank. No. 3 cam has now returned the slide *s* into the position shown in Fig. 6, and has passed around partially out of sight, and cam No. 5 is brought into operation, first, to operate on the lever V, to take the slide-holder T to the right, carrying back the pointed holder *l*, and, following

up a direct action, it depresses the lever X, thereby causing the descent of the cupping or forming tool, which takes the blank sufficiently into the holder L to impart to it the desired cup-shape, which cup, with the continuous series formed into a chain, is held up by the spring before referred to, marked N, exhibited at Figs. 7 and 8; after which the said central bed-tool retires or falls by the action of the recessed cam 7, and the cupping or forming tool rises at the same time, thereby leaving the center free for the advance of another blank in position underneath the pointed holder *l*. The advancing of the last blank and the pointed holder has brought into action the partly invisible slides *p* and *n*, as before referred to, exhibited detached at Fig. 12, which has set the cup formed in position that, as the same is being elevated by the action of the lever Y, its points will thread through the pierce-holes of the last-advanced blank, when cam No. 4, operating on the annular plate P, will advance the slides *d* and *f*, for bending inward the points lying in their paths, and which slides retire as soon as they have performed their work, by means of the springs *g* and *i*, when cam 6 reverses the annular plate and operates on the radial slides *c* and *e* performing the like operation, when cam 5 will be brought into direct action, to the extent of its throw, on the lever X, causing the descent of the cupping or forming tool, which not only imparts form to the last blank advanced, but planished down the four points operated on by the radial slides, and thus, continuing the operation, the chain, as each succeeding blank is applied, descends through the concentric hole in the central bed, as exhibited at Fig. 8, to be wound up or removed from the machine, as desired. A piece of chain is exhibited so descending from the central bed, at Fig. 5.

At Fig. 15 we have shown a cup and blank in side and top views, with the points of the cup standing above the blank, ready to be bent inward, as exhibited in side and top views at Fig. 16, drawn merely to show that, if we desire to make the chain of an angular form, such as square, rectangular, triangular, or otherwise, two or three points could be operated on as well as the four points here represented, by simply modifying the number of slides and inclines of the annular plate or ring and timing the cams accordingly, as any workman skilled in such mechanical operations will well understand.

Having now described our invention, and the manner we have found well calculated to give effect to the same, we will observe that the general construction and details admit of considerable variation without departing from the spirit and object of our invention—as, for instance, chain of any reasonable diameter, from a sixteenth of an inch to an inch or more, may be made almost with the same facility; and so by the design or pattern of the chain, which may be greatly diversified; and by an

additional operation or operations to the blanks, both as to their flat form and piercings, as well as the raising of slight projections on or depressions in the same, a desirable appearance would be imparted to finished chains, either made of precious metals or alloys of metals, according to the use or purpose for which such chains are or may be required.

We do not here claim the chain made as a new manufacture, as it may form the subject of a future application for Letters Patent; but

We claim—

1. The combination, with the tubular holder, cupping tool, and horizontal slides or their equivalents, of mechanism, substantially as described, for imparting to the said devices the movements set forth.

2. The stationary boss M, its slides *c d e f*, in combination with the reciprocating ring P having cams *u v w x*, arranged as described, so as to force inward one or more of said slides on its movement in one direction, and the other slides on its movement in the other direction.

3. The combination of the slides, operating substantially as described, of a holder, L, into which a blank is forced, so as to turn up the arms, by a descending tool, K, and having a limited vertical movement only, for the purpose specified.

4. The combination of the slides, the holder operating as set forth, the feeding-plate *k*, and retainer *l*.

5. The combination, with the holder and feeder plate *k*, of the plates *n p*, recessed at the ends, and operating substantially as set forth.

6. The holder L, having a rigid mouth and recessed at the side, and provided with a spring, N, for the purpose set forth.

7. The vertical reciprocating tool L, recessed to receive the blank and the chain attached thereto, and operating with the cupping-tool, as set forth.

WALTER BANCROFT. [L. S.]
JOHN WOOD. [L. S.]

Witnesses:

JAMES S. COCKINGS,
WILLIAM LOACH.