(No Model.) 2 Sheets—Sheet 1.

W. O. MILLER.

LOOP FORMING MACHINE.

No. 429,540. Patented June 3, 1890.

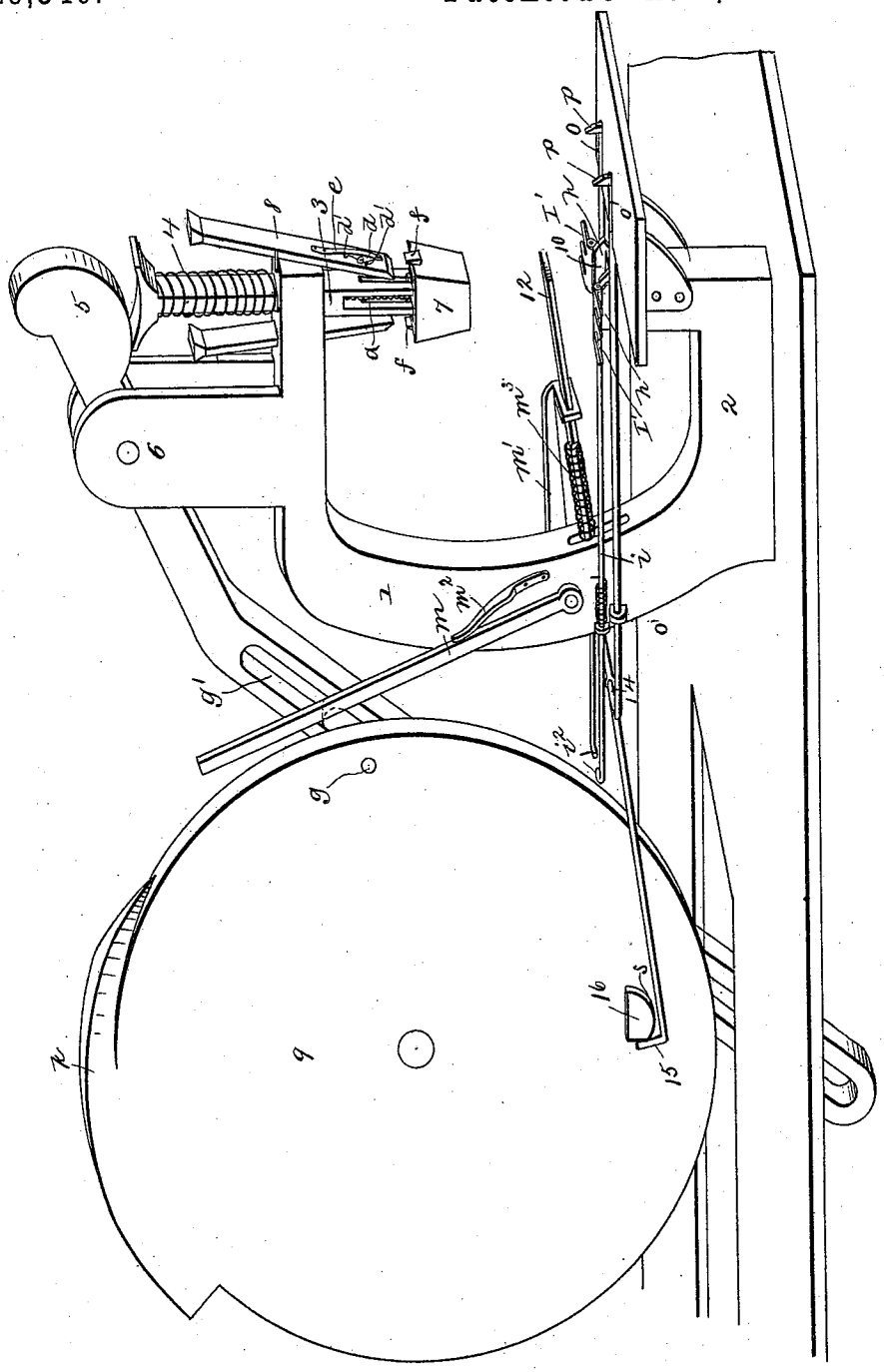


Fig. 1.

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(No Model.) 2 Sheets—Sheet 2.

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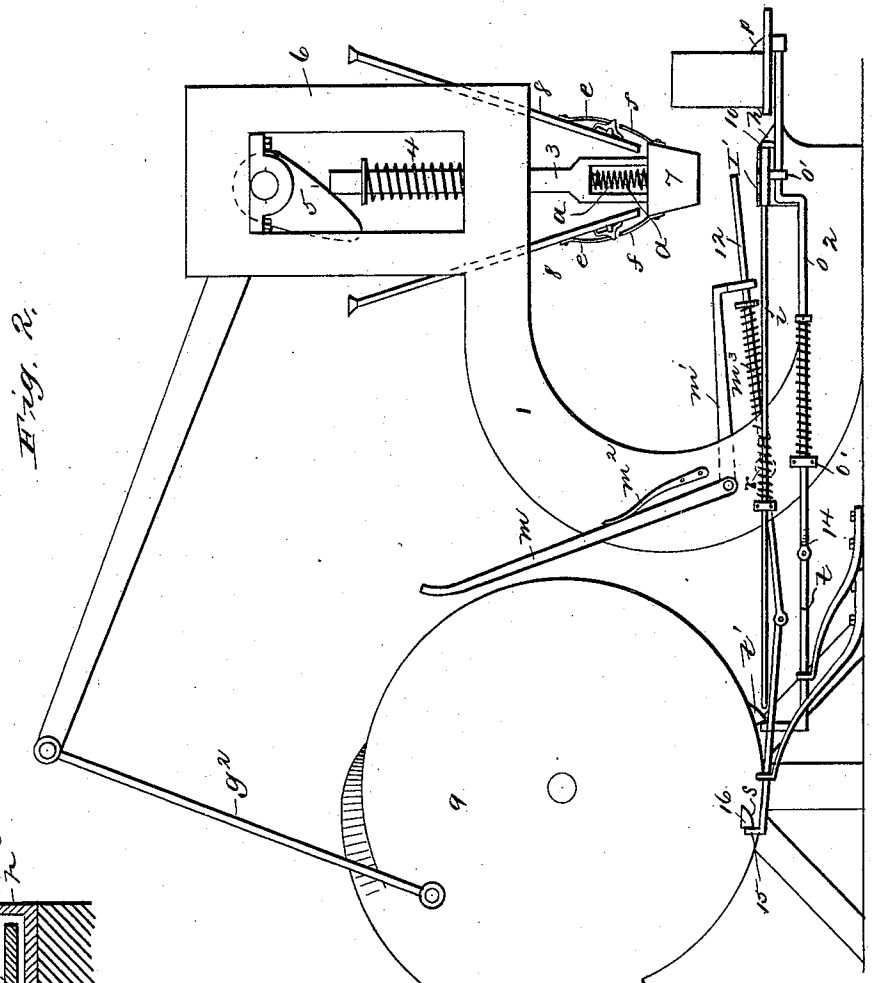


Fig. 2.

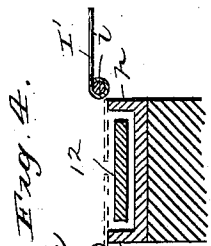


Fig. 4.

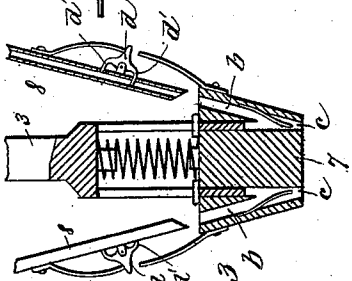


Fig. 3.

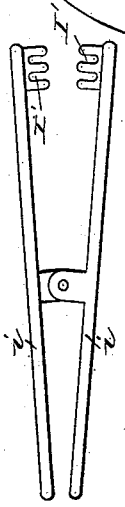


Fig. 5

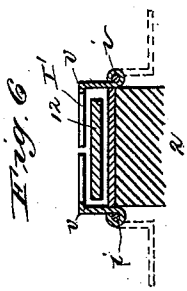


Fig. 6

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UNITED STATES PATENT OFFICE.

WILLIAM O. MILLER, OF QUINCY, ILLINOIS.

LOOP-FORMING MACHINE.

SPECIFICATION forming part of Letters Patent No. 429,540, dated June 3, 1890.

Application filed April 2, 1889. Serial No. 305,682. (No model.)

To all whom it may concern:

Be it known that I, WILLIAM O. MILLER, of Quincy, in the county of Adams and State of Illinois, have invented certain new and useful Improvements in Stapling-Machines for Forming Leather Loops, &c.; and I do hereby declare the following to be a full, clear, and exact description of the same, reference being had to the accompanying drawings, forming a part of this specification, and to the figures and letters of reference marked thereon.

This invention relates to an improved machine for inserting staples in leather and similar material and for forming loops or rings of such material, the abutting edges of the material being united by staples, the object of the invention being to produce a machine for performing the operations mentioned automatically and with great rapidity, and at the same time a machine of great simplicity, which can be produced and operated at comparatively little cost.

To these ends the invention consists in a staple holding and driving mechanism for inserting two staples parallel to each other, together with staple-receptacles for feeding the staples forward at the proper moment.

The invention further consists in combining with a stapling mechanism, preferably such as described, an anvil and jaws for grasping and holding a leather loop, and, if desired, bending the same into shape for the insertion of the staples, with mechanism for automatically performing said operations and feeding the leather blank and discharging the completed loops at the proper times. And the invention further consists in certain novel details of construction and combinations and arrangements of parts to be hereinafter described, and pointed out particularly in the claims at the end of this specification.

In the accompanying drawings, Figure 1 is a perspective view of a machine constructed in accordance with my invention. Fig. 2 is a side elevation showing a modification. Fig. 3 is a sectional view through the staple holding and driving devices. Fig. 4 is a sectional view through the anvil and loop bending and holding devices. Fig. 5 is a view of a modified form of folding-arms. Fig. 6 is another modification of the same.

Similar letters and numerals of reference in the several figures indicate the same parts.

The frame or standard 1, which carries the principal parts of the mechanism, is mounted on a base 2 and is preferably of the curved shape shown, to leave the proper clearance at the center for the operative parts and the proper handling of the work, affording at the same time the maximum strength. Working in suitable bearings in the upper end of the standard 1 is the plunger 3, held in elevated position by the spring 4 taking its bearing on the standard and beneath the enlarged upper end of the plunger, on which the cam or lever 5 for forcing the plunger down rests, the bearing for said cam or lever being also in the top of the standard, preferably in extensions 6, Fig. 1.

Mounted on the lower end of the plunger 3 is the block or head 7, capable of a sliding movement up and down, the spring *a* serving to keep it normally depressed, in which position the side passages *b*, through which the staples enter, are open, as the ends of the arms of the plunger are above them. Said side passages communicate with the central passages *c*, from which the staples are ejected into the leather by the arms of the plunger, as will be readily understood, suitable retaining-springs being arranged therein, of course, to prevent the staples from dropping out before the plunger descends.

The staples may be fed into the side passages *b* by hand; but in the preferred construction I provide hoppers 8 8, which may be mounted on the head 7, but preferably, as shown, only register therewith when the plunger and head are elevated, suitable staple retaining and feeding devices—such as the levers *d* with the two projections *d' d'*—extending into the path of the staples and operated in one direction by the springs *e* to throw the lower projection in to engage the bottom staple and operated by the cam surface or projection *f* on the head to release the bottom staple and cause the upper projection to engage the next staple above, being provided for feeding one staple at a time and cutting off the feed when the plunger and head are depressed.

An operating wheel or disk 9 is mounted

on the base at the rear of the standard 1, to which the power is applied for driving the various parts of the machine through intermediate levers and appropriate gearing, to be hereinafter described.

The preferred mode of operating the lever or cam for depressing the plunger is by a pin g on wheel 9, working in a slot g' in the long arm of the lever, as shown in Fig. 1; but, if desired, the plan adopted in Fig. 2, in which a link g^2 connects the lever and wheel, may be employed to advantage.

When the machine is particularly designed for forming loops of leather and similar material for harness, &c., the anvil portion of the standard 1 is provided with means for folding the ends of the strip laid thereon and for holding such strip in position with the ends abutting or in juxtaposition until the staples are inserted. In Fig. 1 a die 10 is placed on the anvil portion of the standard having the raised portions h h on each side, and lying in proximity to the die on each side are the folding-arms i i, supported on the standard and operating when the strip has been pressed into the die to fold the ends over flat, as shown in Fig. 4, and retain them in this position until the head and plunger descend and insert the staples, suitable slots or openings I′ I′ being formed in the folding-blades for the passage of the staples.

The folders are operated periodically by the wheel 9, a wedge-shaped cam k being formed on its periphery, which as the wheel rotates enters between the inwardly-turned ends i^2 i^2 of the arms i and rotates the same, turning the blades in over the die. Before the cam k has passed the plunger descends and inserts the staples.

Instead of rotating the folding-arms as just described, it is obvious that they may be, as shown in Fig. 5, pivoted together or to the frame at approximately their centers, and have a movement toward and from each other without any rotary movement; but the devices first mentioned are found to give better results, and are therefore preferably employed.

It is essential that some device be employed around which the loop can be formed, and which will serve to clinch the ends of the staples, such as a clamping-rod or bar 12, having its rear end connected loosely to the rod or extension 14, provided with the hook 15, engaging the projection 16 on the wheel to reciprocate the said bar and the strip-feeding mechanisms, which latter will be presently described. This bar 12, besides being moved longitudinally, is capable of an oscillatory movement up and down, such movement being caused by the lever m, pivoted in the standard and having the extended arm m' encircling the bar a short distance back of the die, a spring m^2, engaging said lever, serving to keep the bar normally elevated, and a spring m^3 serving to keep it normally pressed forward over the die. The cam k, engaging the lever m, depresses the bar or clamp and forces the strip lying across the die down into the same in position to have the ends folded in, and after the stapling operation the projection 16, engaging the end of the extension or rod, as aforesaid, draws the bar or clamp out, and the loop, coming in contact with the encircling arm m', is pushed off the said bar or clamp.

A mechanism for feeding the blanks is provided, consisting of the carrying-arms o, moving in guides o' on the side of the standard and connected at their rear ends to the rod 14, which gives the carrying-arms the necessary reciprocating movement. The forward ends of the carrying-arms are provided with teeth or projections p, which engage the blank or strip and draw it forward to a position over the die in position to be folded, as before described.

If desired, a hopper may be provided for the strips, as shown in Fig. 2, and the teeth or projections p be arranged to engage only the bottom one and draw it forward, as will be understood upon an inspection of said Fig. 2.

The mechanism for operating the various parts may be changed and altered in various ways without departing from the spirit of my invention—as shown, for instance, in Fig. 2, wherein it will be particularly noted that besides the difference in the plunger-depressing mechanism before pointed out the bar and feed operating devices are separate and somewhat altered, the bar being in this case mounted to slide freely in a bearing r, pivoting in the standard, the projection on the wheel for withdrawing it, however, being the same, and is so arranged in both instances that when the wheel has rotated to the proper point the curved surface s will throw the hook out of engagement and allow the bar to return to normal position. The rod t for operating the feeding devices in Fig. 2 is operated by the projection t' on the periphery of the wheel out of the line of the lever.

In the modification Fig. 6 the sides of the die are dispensed with and the folding arms are bent at substantially right angles at the points v, and are adapted, after the bar has clamped the strip in place, to fold the same clear over the top, as shown.

From the above description the operation of the machine will be readily understood; but for the sake of clearness I will set forth, briefly, the sequence of operations performed by the machine in making a harness-loop.

Assuming that the parts are in the position shown in Fig. 2, the first movement is of the feeding-arms, which carry the blank forward to a position over the die and then being released from the projection t immediately retreat; the cam on the wheel then comes in contact with the lever and moves the bar down, clamping the blank and forcing it into the die; the folding-arms being then operated on by the cam fold the ends of the blank over the bar and hold them in such position

until the plunger descends and inserts the staple, after which the plunger and folding-arms resume normal position and the bar is elevated and retracted, discharging the completed loop, when the machine is ready to form another loop in the same manner.

The operation of the staple-driving devices is as follows: When at the top of its stroke the staples are fed forward, as previously described, and when the plunger descends the spring-pressed head first comes in contact with the leather and its motion is arrested; but the plunger, continuing to move, forces the staple ahead and into the leather, the head forming the staple support and guides. As the plunger rises the spring moves the head again to normal position.

It is obvious that the equivalent of the elements, going to make up the complete machine herein described may be employed without departing from the spirit of my invention, and therefore I do not wish to be understood as limiting myself to the particular devices set forth.

Having thus described my invention, what I claim as new is—

1. The combination, with the reciprocating plunger of a staple-driver and the head mounted loosely thereon with the staple-guides therein, of the stationary staple-hoppers registering with said guides, the detent having the two projections for engaging the staples, the spring for holding the detent depressed, and the projection on the head engaging the detent to elevate the same and release the bottom staple, substantially as described.

2. The combination, with the standard, the plunger reciprocating therein, the head mounted on the plunger and provided with the staple-guides in line with the plunger, and side passages leading into said guides, of the stationary staple-hopper located above the head and registering with said side passages when the plunger is elevated, the detent engaging the staples in the hopper to retain the same, and the projection on the head engaging said detent to release a staple, substantially as described.

3. In a loop-forming machine, the combination, with the bifurcated plunger, of the head mounted loosely thereon with the parallel staple-guides therein in which the arms of the said plunger work, whereby two or more parallel staples may be inserted by a single stroke of the plunger, substantially as described.

4. In a loop-forming machine, the combination, with the bifurcated plunger, of the head mounted loosely thereon with the parallel staple-guides therein, in which the arms of the plunger work, whereby two parallel staples may be inserted by one stroke of the plunger, and the spring for keeping the head in position located between the bifurcated arms of the plunger, substantially as described.

5. In a loop-forming machine, the combination, with the staple-driver for uniting the ends of the blank, of the die, the bar or clamp for holding the blank, and the folding-arms for folding the ends of the blank over the bar or clamp for the insertion of the staple, substantially as described.

6. In a loop-forming machine, the combination, with the stapling device, of the die, the bar or clamp for holding the blank, and the folding-arms with the fingers for folding the ends of the blank over the bar or clamp, whereby the staples may be inserted into the loop between said fingers without releasing the folding-arms, substantially as described.

7. In a loop-forming machine, the combination, with the die, the bar or clamp around which the blanks are wrapped, and the folding-arms, of the arm adapted to engage the loop on the bar or clamp for discharging the same, substantially as described.

8. In a loop-forming machine, the combination, with the standard and stapling device working therein, of the die, the bar or clamp for the blank, the pivoted folding-arms, the arms for feeding the blanks to the die, and the arm for discharging the completed loop, substantially as and for the purpose set forth.

9. In a loop-forming machine, the combination, with the stapling device having the parallel staple-guides and bifurcated plunger, as described, of the die for the loop, and the folding-arms for bending the blank into shape beneath the staple-driver, whereby the loop may be secured at two points by one stroke of the plunger, substantially as described.

10. In a loop-forming machine, the combination, with the standard, the operating-wheel, and the stapling device operated by the wheel, of the die, the folding-arms having the extended ends engaging a cam on the wheel, and the bar or clamp depressed by the wheel and having the extended portion engaging a projection on said wheel whereby it is withdrawn, substantially as and for the purpose set forth.

11. In a loop-forming machine, the combination, with the stapling device and operating-wheel having the cam thereon, of the die, the bar or clamp having the extended part engaging a projection on the wheel, whereby it is moved longitudinally, and the lever engaging the cam on said wheel and embracing the bar or clamp for depressing the same, substantially as described.

12. In a loop-forming machine, the combination, with the stapling device and operating-wheel having the cam thereon, of the die, the bar or clamp engaging the wheel whereby it is moved longitudinally in one direction, and a spring for moving it in the opposite direction, a lever engaging a cam on said wheel and embracing the bar or clamp to depress the same, and the folding-arms, substantially as described.

13. In a loop-forming machine, the combination, with the stapling device and operat-

ing-wheel, of the folding-arms moved by the wheel to fold the blank, the feeding-arms for presenting the blank to the die and folding-arms, and the projection on the wheel for moving said folding-arms, substantially as described.

14. In a loop-forming machine, the combination, with the stapling device and operating-wheel, of the die, the blank-feeding arms, the bar or clamp connected to said arms, the extended portion engaged by the wheel to operate said feeding-arms and clamp, and the folding-arms, substantially as described.

15. In a loop-forming machine, the combination, with the operating-wheel, die, clamp, and folding-arms, of the hopper for the blanks, and the feeding-arms adapted to engage the lowermost blank in the hopper, substantially as described.

16. In a loop-forming machine, the combination, with the die and bar or clamp around which the blank is folded, of the folding-arms, the portions of which engaging the blanks are bent at right angles and are adapted to fold over the top of the bar or clamp, substantially as described.

17. In a loop-forming machine, the combination, with the die and folding-arms, of the vertically and longitudinally movable bar around which the blank is folded, whereby the loop may be withdrawn from the die, substantially as described.

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