(No Model.) 3 Sheets—Sheet 1

W. P. GREENLAW.

SEWING MACHINE.

No. 458,363. Patented Aug. 25, 1891.

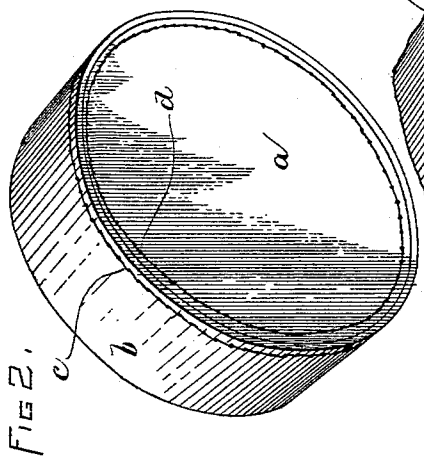


FIG. 2.

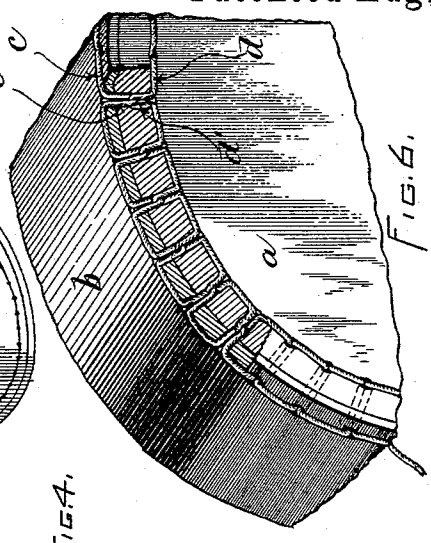


FIG. 4.

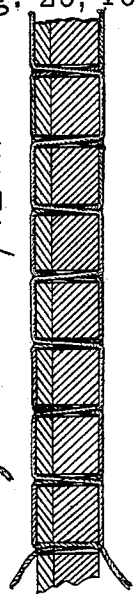


FIG. 6.

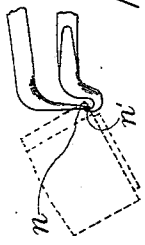


FIG. 8.

FIG. 7.

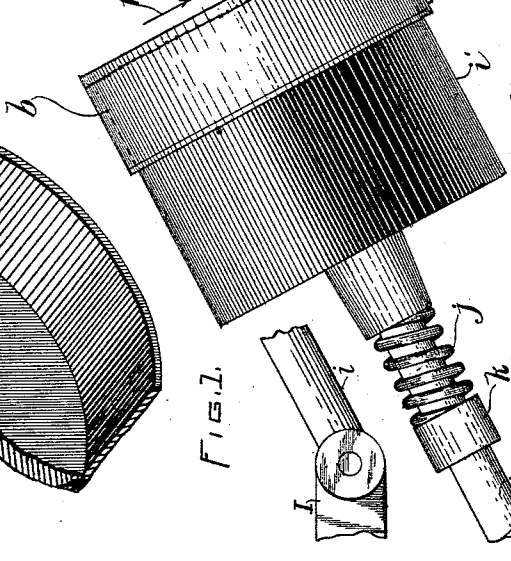


FIG. 1.

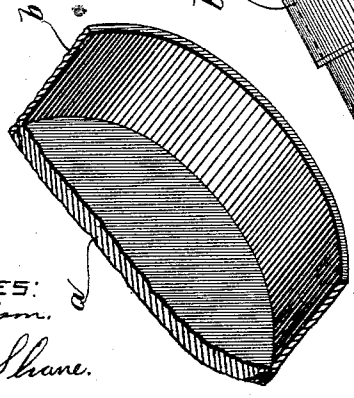


FIG. 3.

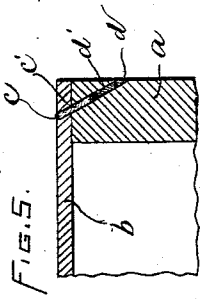


FIG. 5.

WITNESSES:
A. D. Harrison.
B. A. McShane.

INVENTOR:
W. P. Greenlaw
by
Wright Brown Quinby
Attys.

THE NORRIS PETERS CO., PHOTO-LITHO., WASHINGTON, D. C.

(No Model.) 3 Sheets—Sheet 2.

W. P. GREENLAW.

SEWING MACHINE.

No. 458,363. Patented Aug. 25, 1891.

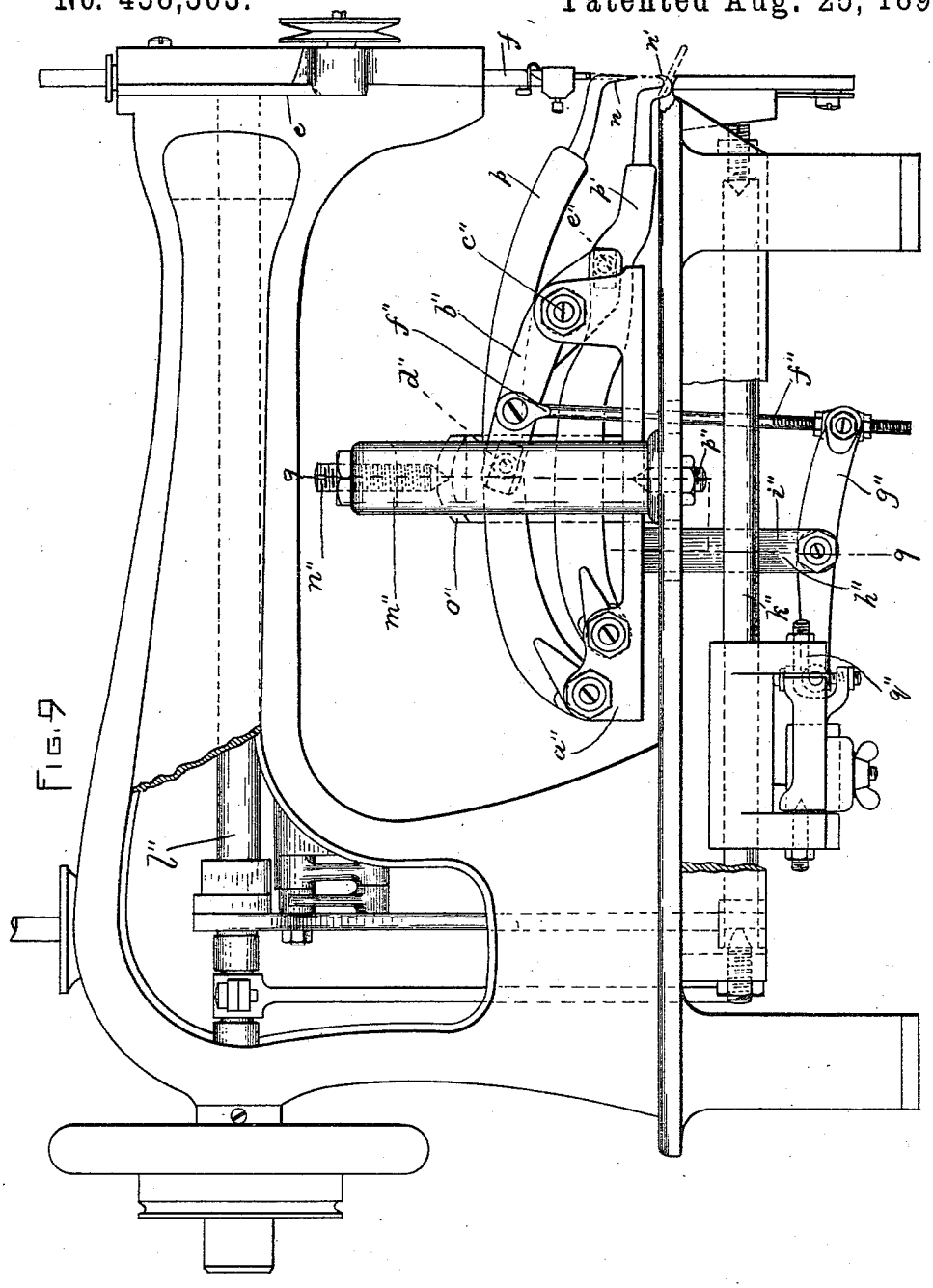


Fig. 9

WITNESSES:
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W. P. Greenlaw
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THE NORRIS PETERS CO., PHOTO-LITHO., WASHINGTON, D. C.

(No Model.) 3 Sheets—Sheet 3.

W. P. GREENLAW.

SEWING MACHINE.

No. 458,363. Patented Aug. 25, 1891.

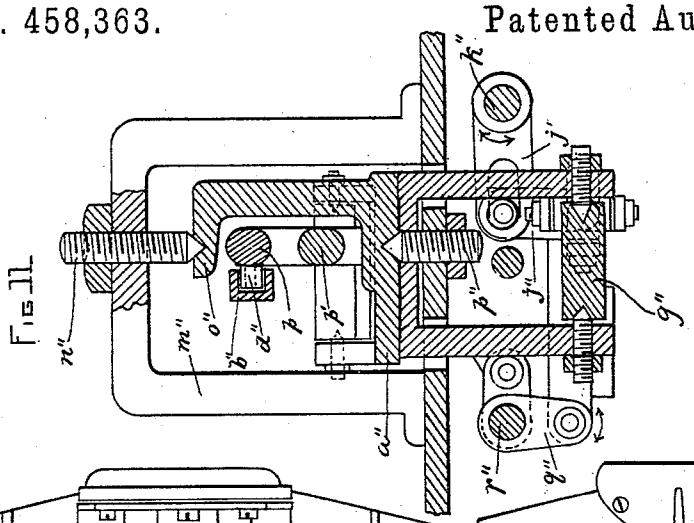


FIG. 11.

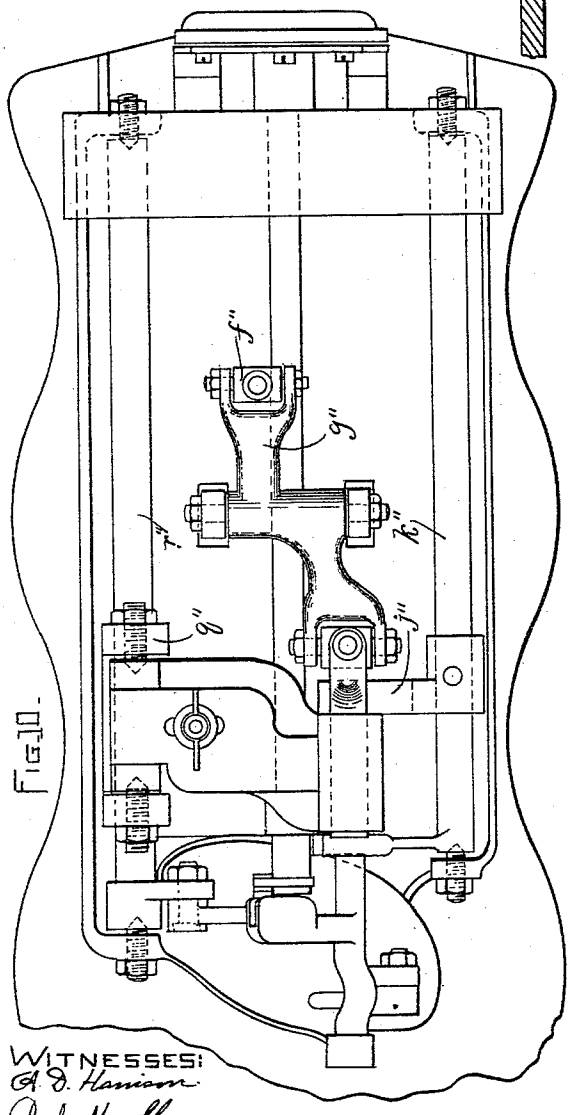


FIG. 10.

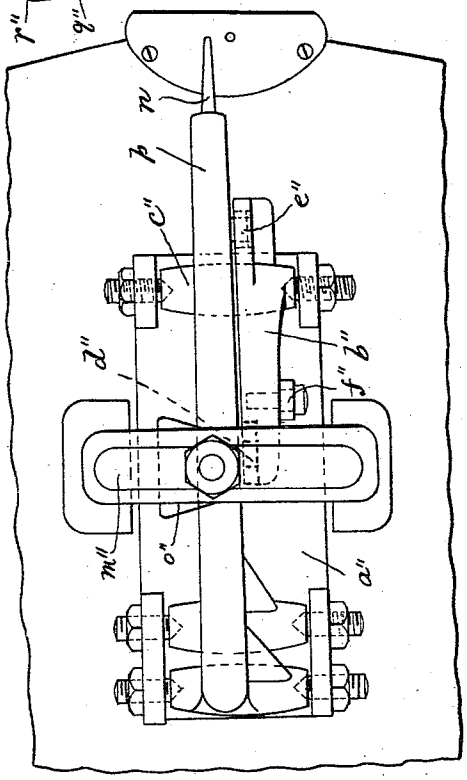


FIG. 12.

WITNESSES:
A. D. Harrison
J. A. McShane.

INVENTOR:
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by Wright Brown Quinby & Atkys.

THE NORRIS PETERS CO., PHOTO-LITHO., WASHINGTON, D. C.

UNITED STATES PATENT OFFICE.

WILLIAM P. GREENLAW, OF BROCKTON, MASSACHUSETTS, ASSIGNOR OF ONE-HALF TO THE DOW MANUFACTURING COMPANY, OF SAME PLACE.

SEWING-MACHINE.

SPECIFICATION forming part of Letters Patent No. 458,363, dated August 25, 1891.

Application filed February 3, 1891. Serial No. 380,009. (No model.)

To all whom it may concern:

Be it known that I, WILLIAM P. GREENLAW, of Brockton, in the county of Plymouth and State of Massachusetts, have invented certain new and useful Improvements in Machines for Uniting Pieces of Material at Right Angles to Each Other, of which the following is a specification.

This invention relates, principally, to the manufacture of boxes and covers therefor, made of leather or other like material, in which the component parts—viz., the bottom and top pieces and the body and flange standing at right angles to the bottom and top pieces—are united by stitches.

The invention has for its object to enable two pieces or parts which in a manufactured article, such as a box or a box-cover, stand at substantially a right angle with each other to be stitched together more rapidly and economically than heretofore; and to this end the invention consists in the improved means hereinafter described and claimed. The said improved means include, first, any suitable lock-stitch-forming mechanism; secondly, devices for supporting the two parts in the relative positions they occupy in the manufactured article, said devices being arranged in such relation to the stitch-forming mechanism that the angle or apex of the two parts supported by them will be in position to receive the lock-stitches formed by said mechanism, and, thirdly, two work-perforating awls arranged to enter the surfaces of the two parts and form orifices for the passage of the needle through said parts, said awls moving in opposite directions, so that each penetrates the work from the outer surface, the two awls making a hole which is not left burred or ragged at either end, as it would be at one end if made by a single awl entering one surface and emerging from the opposite surface, said awls also entering the two surfaces simultaneously, exactly defining the points at which the needle enters and leaves the work, so that the stitches cannot be given an irregular form by the deflection of the needle in passing through the work.

Of the accompanying drawings, forming a part of this specification, Figure 1 represents a side elevation of a portion of a Singer sewing-machine provided with devices embodying my invention, the outer end of the hinged rod for the block and a portion of the support therefor being shown in the detailed view at the left. Fig. 2 represents a perspective view of a box-cover, the parts of which are united in accordance with my invention. Fig. 3 represents a perspective view of a portion of said cover, viewed from the under side. Fig. 4 represents a perspective view, partly in section, of a portion of the cover enlarged. Fig. 5 represents a section of a part of the cover. Fig. 6 represents a section showing the parts united by hand-made stitches. Figs. 7 and 8 represent views of the work-penetrating awls. Fig. 9 represents a rear side elevation of a sewing-machine to which my improvements are attached. Fig. 10 represents an inverted plan of the same. Fig. 11 represents a section on line 9 9, Fig. 9. Fig. 12 represents a top view of the support for the awl-carrying lever.

The same letters of reference indicate the same parts in all the figures.

In the drawings, *a* and *b* represent the parts, comprising in the example shown a cylindrical box cover, the part *a* being the flat circular piece or disk constituting the top of the cover, while the part *b* is the flange or rim of the cover and is bent into cylindrical form from a straight strip, the said flange being at or near a right angle with the top.

In carrying out my invention I unite the parts *a* and *b* by means of two threads *c* and *d*, having loops *c'* *d'*, which enter the material of said parts and are interlocked beneath the angle formed by the outer surfaces thereof. One of the threads is laid upon the outer surface of the part *a*, while the other thread is laid upon the outer surface of the part *b*, the loops of each thread entering the material of the part upon which the thread is laid and being interlocked with the loops of the other thread at points between the outer surfaces of the parts *a b*. The fastening produced by the threads *c d* and their interlocked loops *c'* *d'* constitutes a series of lock-stitches, such as may be formed by various well-known lock-stitch-forming mechanisms.

I have used a Singer sewing-machine with good results in uniting the parts *a b* by the stitches above described.

In Fig. 1 I show a portion of the head *e* and

bed *o* of a Singer machine, together with the needle-bar *f*, needle *f'*, and certain attachments which I have added to adapt the machine to the purposes of my invention. Important among said attachments are supporting devices arranged to support the work in such position relatively to the needle *f'* that the needle will enter the outer surface of one piece of the work near the angle or corner and emerge from the outer surface of the other piece at the opposite side of the said angle, so that the interlocked loops of the stitches will be formed obliquely to said surfaces, as shown in Fig. 5. Said supporting devices may be variously modified in construction, according to the nature of the work. When the work is cylindrical, as here shown, the supporting devices comprise, first, a gage or rest *h*, which is preferably an anti-friction roller journaled in a holder or bearing *h'*, affixed to the bed and arranged to bear on the top *a*, and, secondly, a rod or arm *i*, which is rigidly supported by suitable means hereinafter described and supports a loosely-rotating cylindrical block *i'*, adapted to enter the cover or box, said rod or arm and the block thereon supporting the work against downward movement in the direction indicated by the arrow, while the gage or rest *h* supports the work against lateral movement in the direction indicated by the arrow 2. The block *i'* is preferably adapted to move slightly in the direction of the length of the rod *i*, and is normally pressed by a spring *j* in the direction indicated by the arrow 2, thus holding the work with a yielding pressure against the gage or rest *h*, said spring being supported at one end by a collar *k*, rigidly affixed to the rod *i*. I prefer to hinge the rod *i* to a fixed support, as at I in Fig. 1, or otherwise adapt it to be moved upwardly away from the bed and needle to permit the application and removal of the work, the rod being rigidly supported against downward movement when at the lowest extreme of its movement, which is the position shown in Fig. 1. I have also shown as a means for supporting the work against downward movement an inclined throat-plate *m*, affixed to the bed *o* and arranged to bear on the exterior of the piece *b* of the work. Said inclined throat-plate is not essential when the arm *i* and block *i'* are used, but becomes necessary when said arm and block are omitted, as they may be in case the work is presented to the machine by hand. I prefer to use said inclined throat, however, in all cases as a local support for the work around the point where the needle emerges from its under side to prevent the needle from pressing the material surrounding the holes outwardly.

Other important attachments are the two awls *n n'*, which are arranged to simultaneously enter the work in opposite directions and to meet within the work, thus forming the holes for the interlocked loops *c' d'*, the awl *n* moving downwardly and entering the outer surface of the top piece *a*, while the awl *n'* moves upwardly and enters the outer surface of the flange or body *b*. The points of the awls are arranged to overlap or pass each other, as shown in Fig. 8, so that while they form a practically continuous hole they do not injuriously collide within the work. The awls are arranged to enter the work in advance of the path in which the needle moves, and they are provided with a lateral or work-feeding movement of exactly the length of a stitch, so that when they are in the work they will move toward the needle, and will then separate and return to their starting-point, leaving a completed hole in position to receive the needle.

Any suitable mechanism may be employed to give the awls their work-penetrating and lateral or work-feeding movements, my invention not being limited in this particular.

I have shown the awls attached to levers *p p'*, which are pivoted independently at their rear ends to a support *a''*, as shown in Fig. 9, said support being pivotally secured to the bed of the machine by means hereinafter described.

b'' represents an arm pivoted at C'' to the forward end of the support *a''*, the upper end of said arm being suitably connected at *d''* to the lever *p* and its opposite end at *e''* to the lever *p'*. To the arm *b''* is pivotally attached a pitman *f''*, having connection at its lower end with a lever *g''*, pivoted at *h''* to a supporting-frame *i''*, attached to the under side of the support *a''* through an opening in the bed of the machine, the arrangement being such that when vertical movement is imparted to the pitman through lever *g''* the arm *b''* causes the awl-carrying ends of levers *p* and *p'* to be moved simultaneously only in opposite directions. The lever *g''*, which operates the pitman *f''*, and through the latter the awl-carrying levers, is pivotally attached at its other end to an arm *j''*, secured to a shaft *k''*, which shaft is pivoted at its ends to the bed of the machine and receives a partial rotary motion from the main driving-shaft *l''* of the machine and devices intermediate of said driving-shaft and the shaft *k''* in the usual manner in this class of machines, the movements being so timed that the rocking of shaft *k''* will cause arm *j''* to operate lever *g''* and the levers *p p'*.

m'' represents a yoke secured to the bed of the machine and provided with a screw *n''* in its upper portion, having a conical point engaging with an upwardly-projecting lug *o''*, formed on the support *a''*. Another screw *p''* is tapped into the bed of the machine, and its pointed end engages with the under side of the support *a''*, so that the latter is pivoted upon and adapted to be oscillated laterally on the points of said screws, and thereby cause the feeding of the work.

The lateral or feeding movement of the

awls is accomplished through an arm q'' on shaft r'', which rocks in bearings through the same means as that described in regard to shaft k'', said arm being suitably connected to the rear end of lever j'', so that said lever is acted upon in two directions—that is, from shaft k'' to cause the movement of the awl-carrying levers in opposite directions, and from shaft r'' to cause the support a'' to be oscillated laterally, thus causing the awls to feed the work when engaged therewith.

The movements of the awl-operating devices are obtained in the present instance from the common and well-known feeding mechanism of the Singer machine, my devices being substitutes for the latter and operating on substantially the same principle.

The advantages of the two awls moving simultaneously in opposite directions are as follows:

First. Both ends of each hole are made by a movement of the penetrating instrument into the work. Hence there is no outwardly-projecting burr formed on the surface of the work at either end of the hole, as there would be if the hole were made by a single awl entering at one side and emerging from the other. The outer surfaces of the work are therefore left smooth and devoid of burrs or ragged projections.

Secondly. The position of each end of each hole is clearly defined, so that there can be no irregularity in the relative arrangement of the exposed portions of the threads, such as might be caused by deflection of a single awl passing entirely through the work or by deflection of the needle if the latter were relied on to make its own hole. It will be seen, therefore, that by the use of the two awls the work is given a neat and desirable appearance, due to the absence of burrs on its surfaces and to the regularity of the stitches.

By the described method of uniting two pieces at right angles with each other I am enabled to greatly reduce the expense of manufacturing boxes made of leather and other like material, because I am enabled to utilize the stitch-forming mechanism of a lock-stitch sewing-machine. Hence the work can be done much more rapidly than by the method of hand-stitching, which has always been used prior to my invention.

A box or other manufactured article of angular form the parts of which are united by machine-made lock-stitches, as above described, is better than a hand-sewed article is liable to be on account of the greater uniformity of tension in the machine-stitches as compared with hand-sewing.

I do not limit my invention to the manufacture of cylindrical boxes, as it may be applied to the manufacture of boxes and other articles, rectangular and other shape. In sewing boxes not of circular form the rod i and block i' will be omitted and the inclined throat-plate m relied on to support the work against downward displacement.

This invention may be used in sewing various other materials besides leather, as cloth, straw-board, paper, leather-board, binders' board, tar-board, &c., or combinations of one or more of said materials.

The invention is not limited to any particular stitch-forming mechanism, but may be used with any mechanism adapted to form a lock-stitch.

I claim—

1. The combination, with lock-stitch-forming mechanism, of a gage or rest arranged to bear on one surface of a hollow angular piece of work and prevent lateral displacement thereof and a rotary support adapted to enter said hollow piece and permit the rotary movement thereof, said support having a space around it for the hollow piece of work and having its axis of rotation at an angle to the surface of said gage or rest, as set forth.

2. The combination, with lock-stitch-forming mechanism, of a gage or rest arranged to bear on one surface of a hollow angular piece of work and prevent lateral displacement thereof, a rigidly-supported arm, a block mounted to rotate and to move endwise on said arm, and a spring whereby said block is yieldingly pressed toward said rest, as set forth.

3. The combination, with lock-stitch-forming mechanism, of two reciprocating awls and means for giving each of said awls a movement in a direction opposite to that simultaneously given to the other awl to co-operate in piercing a piece of work from two surfaces, as set forth.

4. The combination, with lock-stitch-forming mechanism, of two reciprocating awls and means for giving each of said awls a movement in a direction opposite to that simultaneously given to the other awl, and two work-support ssubstantially at right angles with each other, whereby the awls are adapted to pierce two pieces of work in an angular direction, substantially as described.

5. The combination, with lock-stitch-forming mechanism, of two reciprocating awls, means for giving each of said awls a movement in a direction opposite to that simultaneously given to the other awl to penetrate two surfaces at right angles to each other, and means for giving said awls a lateral or work-feeding movement, as set forth.

In testimony whereof I have signed my name to this specification, in the presence of two subscribing witnesses, this 28th day of January, A. D. 1891.

WILLIAM P. GREENLAW.

Witnesses:
A. D. HARRISON,
B. A. MCSHANE.