

(No Model.)

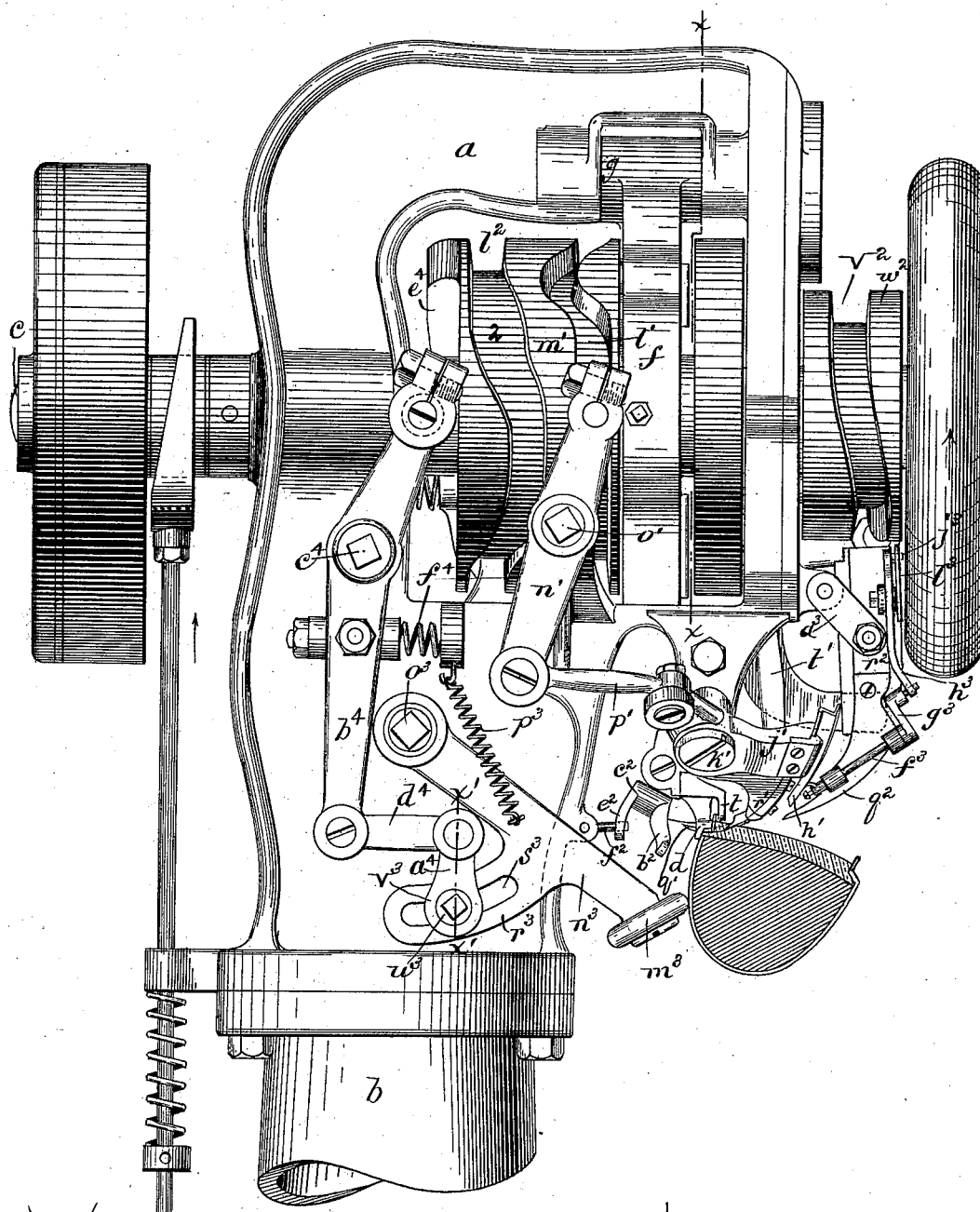
9 Sheets—Sheet 1.

P. A. COUPAL.

SEWING MACHINE FOR UNITING SOLES TO UPPERS.

No. 381,988.

Patented May 1, 1888.



WITNESSES: Fig. 1.
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A. D. Harrison.

INVENTOR.
Peter A. Coupal.
by Wright Brown Rosaley,
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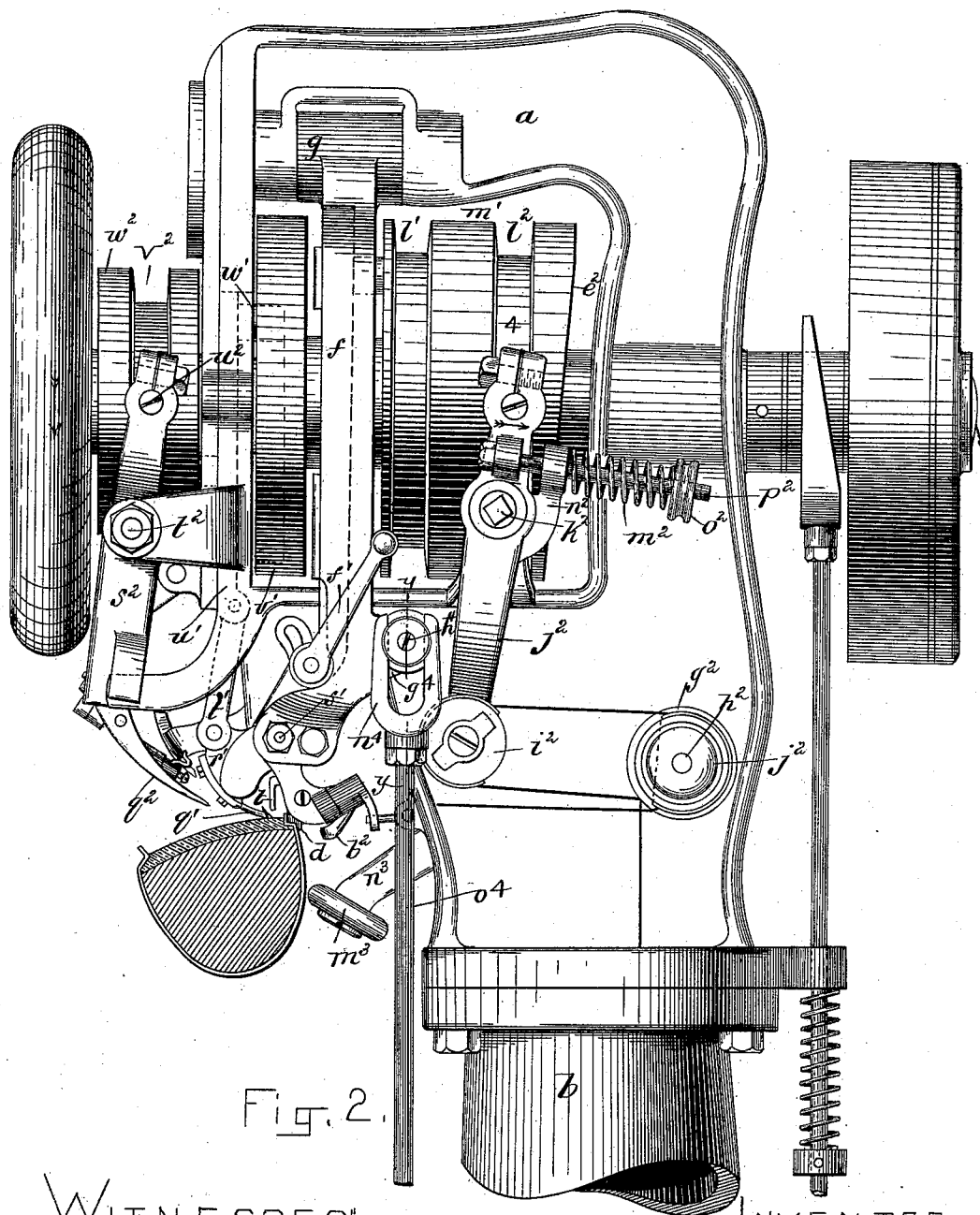


Fig. 2.

WITNESSES:
William C. Ramsay.
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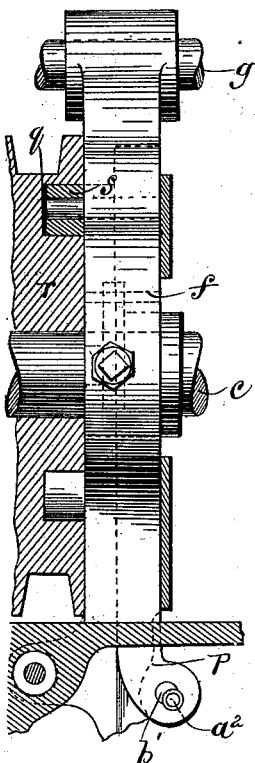


Fig. 4.

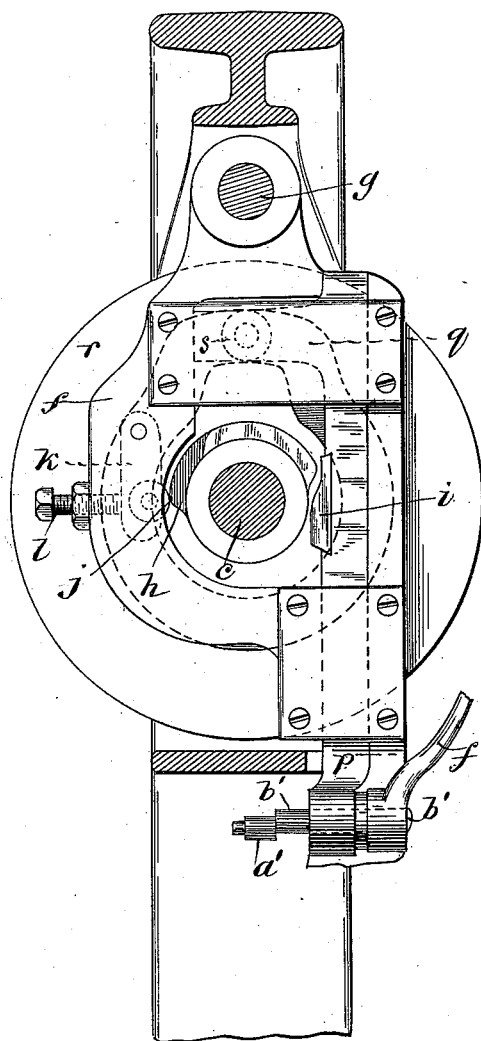


Fig. 3.

WITNESSES:

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(No Model.)

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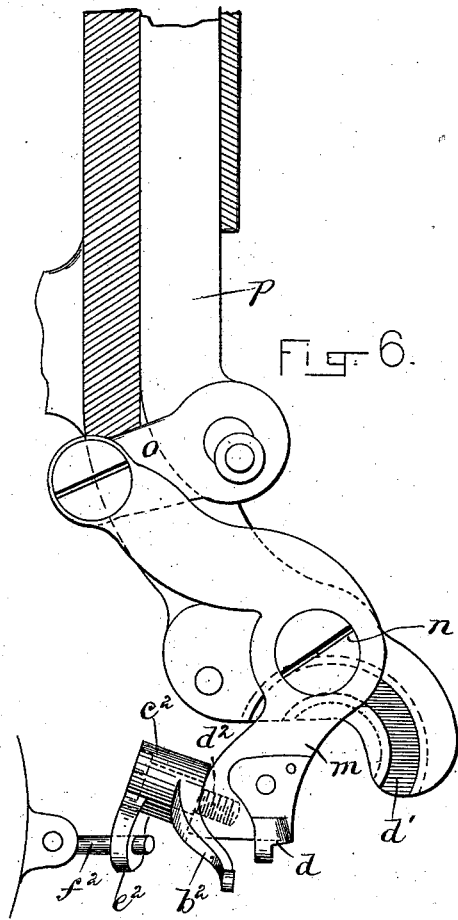


Fig. 6.

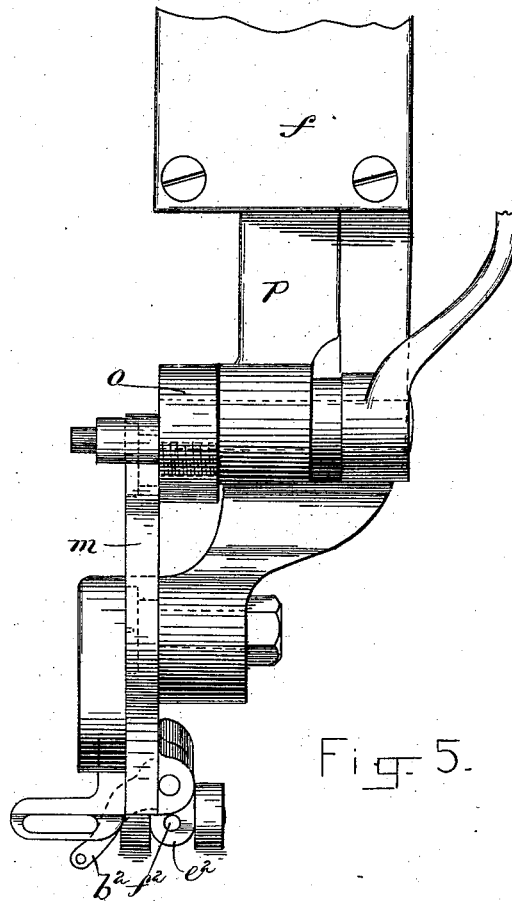


Fig. 5.

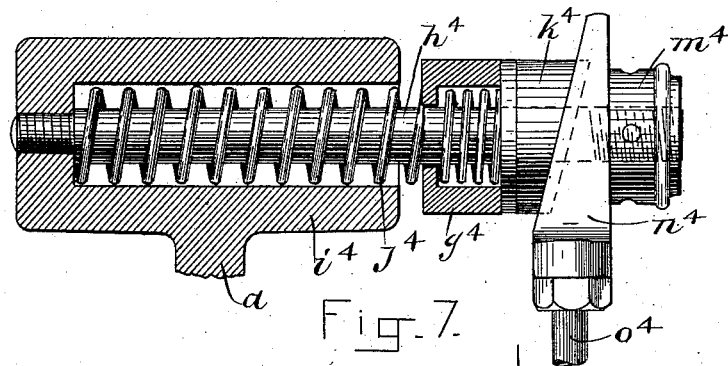


Fig. 7.

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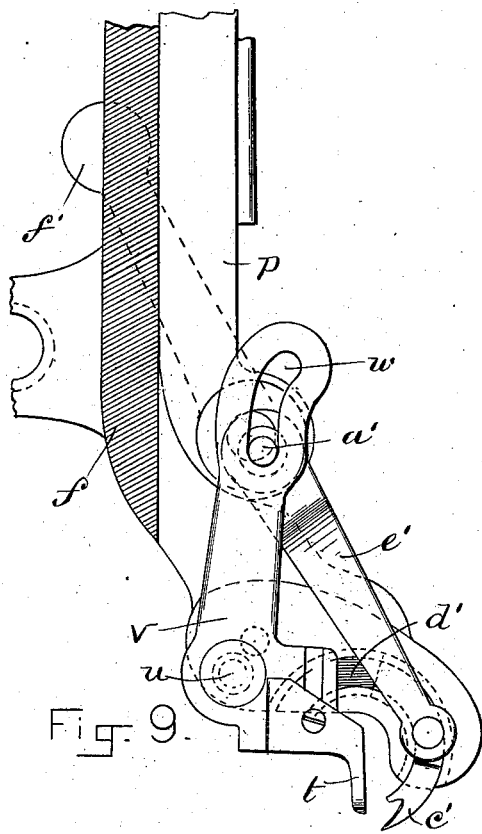


Fig. 9.

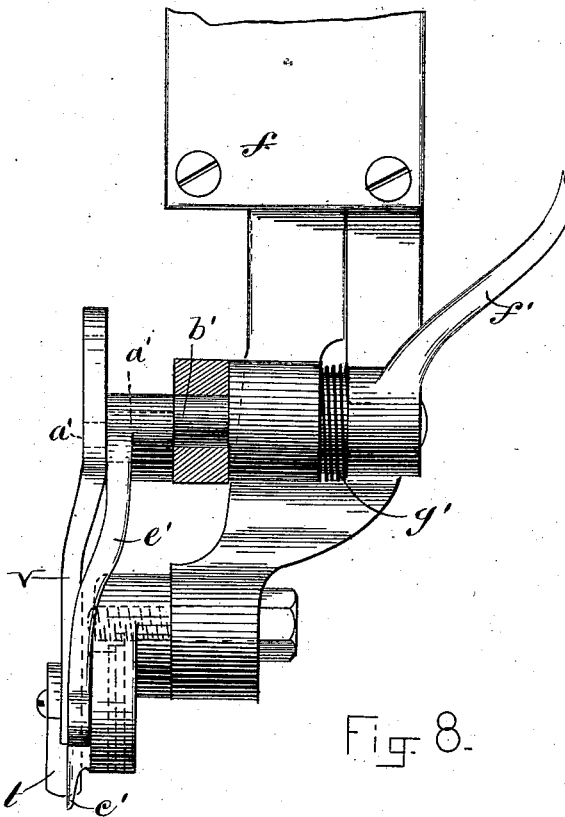


Fig. 8.

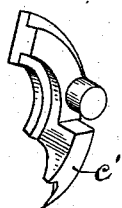


Fig. 10.

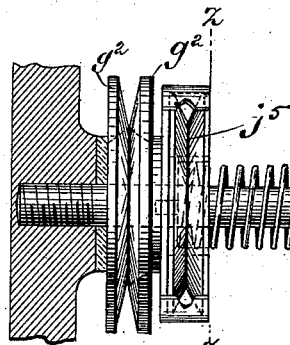


Fig. 11.

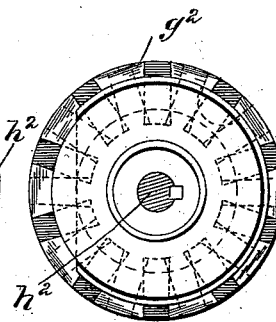


Fig. 12.

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(No Model.)

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P. A. COUPAL.

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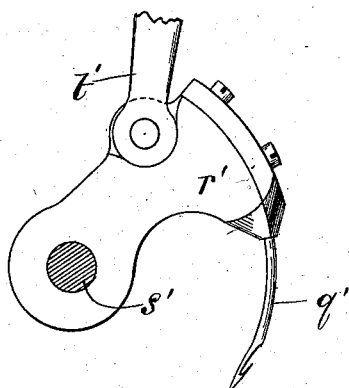


Fig. 15.

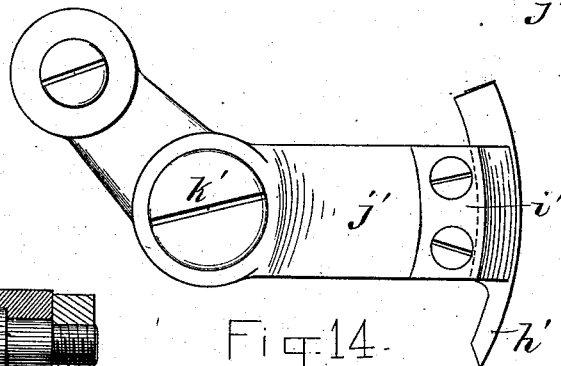


Fig. 14.

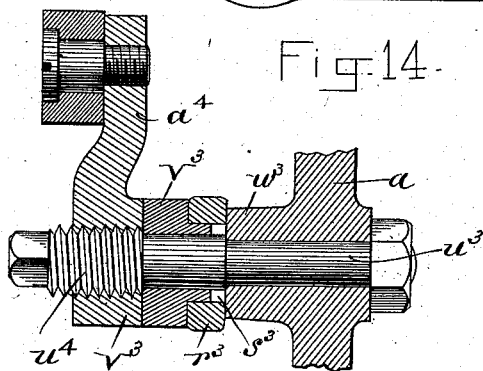


Fig. 16.

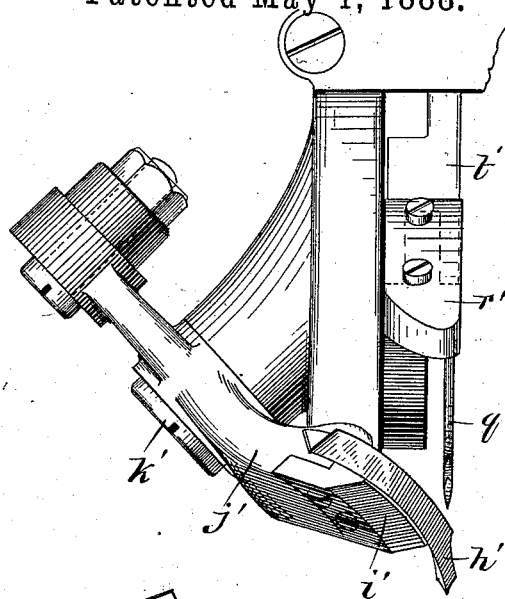


Fig. 13.

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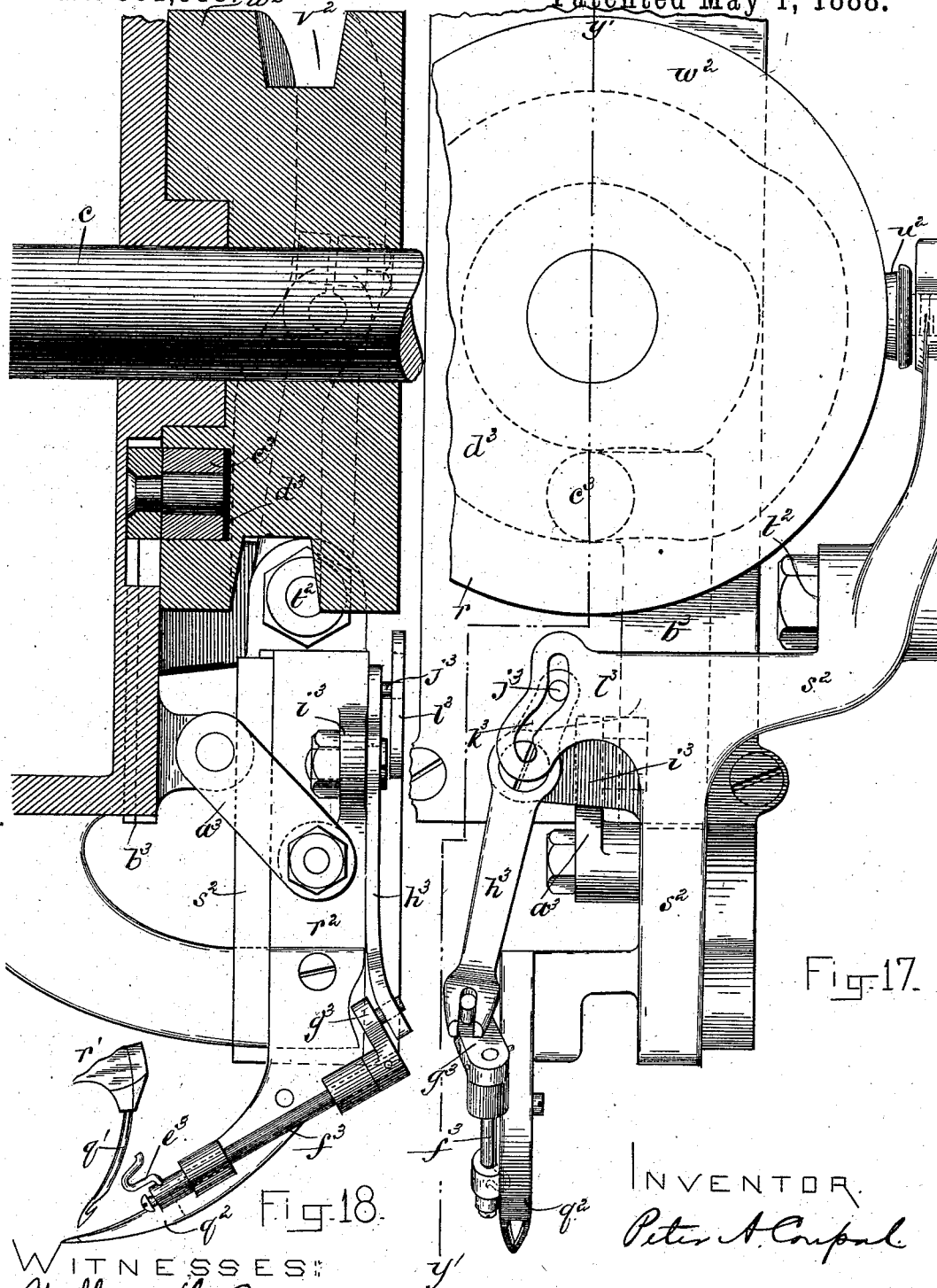
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Patented May 1, 1888.



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(No Model.)

9 Sheets—Sheet 8.

P. A. COUPAL.

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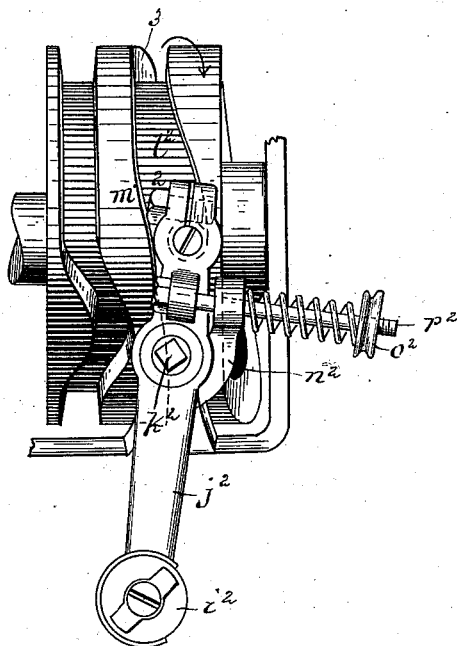


Fig. 19.

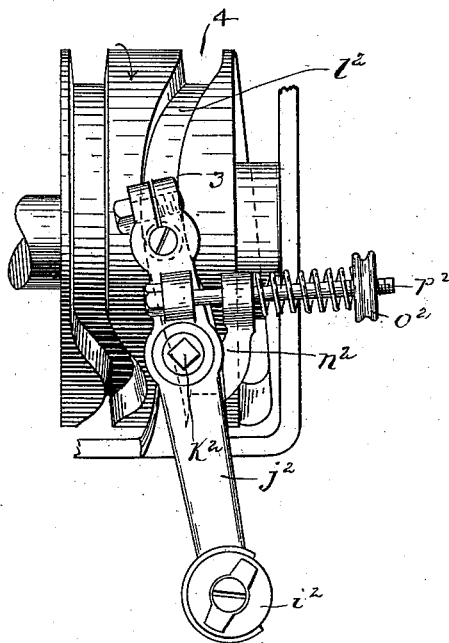


Fig. 20.

WITNESSES:

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(No Model.)

9 Sheets—Sheet 9.

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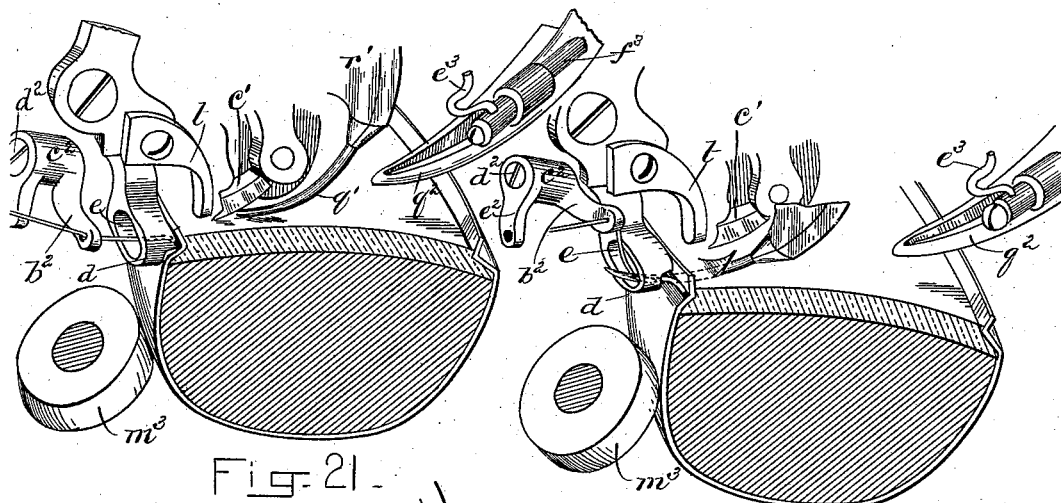


Fig. 21.

Fig. 22.

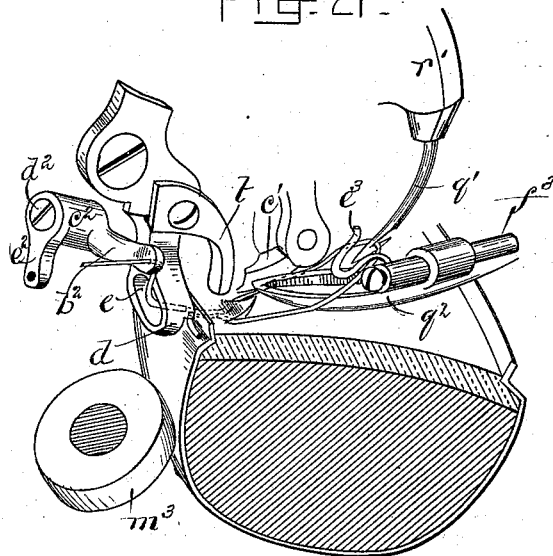


Fig. 23.

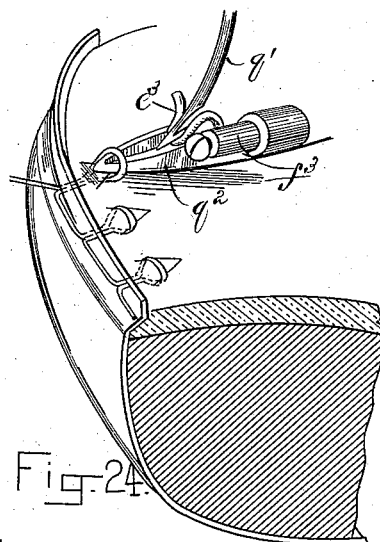


Fig. 24.

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A. D. Hanson.

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by Wright Brown Crossley,
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UNITED STATES PATENT OFFICE.

PETER A. COUPAL, OF BOSTON, MASSACHUSETTS, ASSIGNOR TO THE
LEATHER LOCK SEWING MACHINE ASSOCIATION, OF PORTLAND,
MAINE.

SEWING-MACHINE FOR UNITING SOLES TO UPPERS.

SPECIFICATION forming part of Letters Patent No. 381,988, dated May 1, 1888.

Application filed February 23, 1887. Serial No. 228,531. (No model.)

To all whom it may concern:

Be it known that I, PETER A. COUPAL, of Boston, in the county of Suffolk and State of Massachusetts, have invented certain new and useful Improvements in Machines for Uniting Soles and Uppers, of which the following is a specification.

This invention has for its object to provide improved mechanism for securing uppers to soles of turned shoes by stitches or loops of thread passed through the upper and through a portion of the sole and locked by tongues of leather cut in one of the sides of the sole, as shown in Letters Patent of the United States No. 242,328, granted to T. K. Keith, May 31, 1881, and more particularly to provide certain improvements on the mechanism shown in the joint application of Joseph Coupal and myself for Letters Patent for improvement in sewing machines for connecting soles and uppers, filed April 30, 1886, Serial No. 200,674.

The invention consists in the several improvements, which I will now proceed to describe and claim.

Of the accompanying drawings, forming a part of this specification, Figures 1 and 2 represent side elevations of a machine containing my improvements, taken from opposite sides. Fig. 3 represents a section on line $x x$, Fig. 1. Fig. 4 represents a side elevation and partial section of the parts shown in Fig. 3. Fig. 5 represents an enlarged front elevation of the back-gage and a part of the mechanism that operates it. Fig. 6 represents a side elevation and partial section of the mechanism shown in Fig. 5. Fig. 7 represents a section on line $y y$, Fig. 2. Fig. 8 represents a front elevation of the feed-dog and depth-gage and a part of their operating mechanism. Fig. 9 represents a side elevation of the mechanism shown in Fig. 8. Fig. 10 represents a perspective view of the feed-dog. Fig. 11 represents a side elevation of a tension device. Fig. 12 represents a section on line $z z$, Fig. 11. Fig. 13 represents a front elevation of the needle and the tongue cutting knife and their supporting devices. Fig. 14 represents a bottom view of the knife and its carrier. Fig. 15 represents

a side elevation of the needle and its arm. Fig. 16 represents a section on line $x' x'$, Fig. 1. Fig. 17 represents a front elevation of the loop-spreader and cast-off and their operating mechanism. Fig. 18 represents a section on line $y' y'$, Fig. 17, looking toward the right. Figs. 19 and 20 represent side elevations of the take-up lever and its operating-cam, showing said parts in different positions. Figs. 21, 22, 23, and 24 represent perspective views showing different parts of the loop or stitch forming mechanism.

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

a represents the supporting-frame mounted on a pedestal, b , and having bearings for the driving-shaft c , which imparts motion to the operative parts of the machine.

d represents a back-gage or rest, which is formed to support the lasted shoe at the point where the needle passes through the upper, and has a slot, e , through which the needle passes, said slot being elongated, so that the back-gage can move while the needle is projecting through it. Said back-gage is supported by a swing-piece, f , which is pivoted at g , Figs. 1, 2, 3, and 4, to the frame of the machine, and is oscillated in a plane at right angles to the driving-shaft by a cam, h , on said shaft, said cam rotating between two bearing-surfaces, $i j$, on the swing-piece f . (See Fig. 3.) One of said bearing-surfaces, j , is a roller mounted on a lever, k , which is adjustable by a screw, l , to compensate for wear of the cam and bearing surfaces. The back-gage is not attached directly to the swing-piece f but to a lever, m , Figs. 5 and 6, which is pivoted at n to the swing-piece f , and is connected at its upper end by a link, o , with the lower end of a slide, p , which is fitted to reciprocate vertically in a guide in the swing-piece f , and is reciprocated in said guide by a cam-groove, q , in a disk, r , on the driving-shaft c , said slide having a stud, s , entering said groove.

t represents a depth-gage, which is attached to a lever, v , pivoted at u to an ear on the swing-piece f , and is formed to bear on the surface of the sole at a point close to the mar-

gin and close to the point where the tongue-forming knife and the needle act on the sole, and determines the height at which the shoe is held by the operator. The upper end of the lever *v* has a cam-shaped slot, *w*, Fig. 9, which receives the wrist-pin *a'* of a crank, *b'*, journaled in the lower end of the slide *p*. The vertical movements of said slide oscillate the lever *v*, and thus alternately raise and lower the depth-gage, and also oscillate the lever *m* and move the back-gage, *d*, toward and away from the work.

c' represents a pointed feed-dog the shank or body of which is segmental and is fitted to slide in a segmental groove, *d'*, in the swing-piece *f*, Figs. 6 and 9. Said dog is connected by a rod or link, *e'*, to the wrist-pin *a'* of the crank *b'* in the lower end of the slide *p*, so that the movements of said slide cause the dog to reciprocate or oscillate in a curved path and alternately enter and leave the sole, as hereinafter described.

The crank *b'* is provided with a handle, *j'*, Figs. 2 and 9, by which the operator can turn said crank to simultaneously raise or lower the depth-gage and feed-dog as occasion may require. The crank is prevented from rotating loosely by a spring, *g'*, Fig. 8, which is coiled upon the crank and is attached at one end to the crank and at the other end to a fixed support. The parts are so timed that when the operator places the shoe against the back-gage while the needle is raised the depth-gage and feed-dog are moved downwardly until the depth-gage bears on the sole and the dog enters the latter and presses the shoe against the back-gage, the latter being moved by the lever *m* toward the work, after which the swing-piece *f* is swung in one direction by the cam *h*, causing the feed-dog to feed the work, the dog and depth-gage being then raised and the back-gage moved back from the work, which is thus released before the swing-piece *f* swings in the opposite direction to restore the gages *d* *t* and dog *c'* to their starting position.

h' represents the tongue-cutting knife, which is a segmental piece of sheet metal, V-shaped in cross-section and attached by a removable clamp, *i'*, Figs. 13 and 14, to a lever, *j'*, which is mounted to oscillate on an oblique stud, *k'*, affixed to the frame *a*. The arrangement of said stud and lever is such that the knife oscillates in a plane at an angle of about forty-five degrees to the plane in which the needle moves, the path in which the knife moves intersecting that in which the needle moves, so that the knife in moving forward while the needle is raised cuts a tongue on the sole at the point where the needle enters the sole and then moves back obliquely out of the path of the needle. The needle afterward descends and enters the incision last formed by the knife and penetrates the between substance under said tongue, as described hereinafter.

The lever *j'* is oscillated by means of a cam-

groove, *l'*, in a disk, *m'*, on the driving-shaft, a lever, *n'*, pivoted at *o'* to a fixed arm on the frame *a*, and having at its upper end a stud entering said cam-groove, and a rod, *p'*, connecting the lower end of said lever *n'* with the knife-carrying lever *j'*.

q' represents the needle, which is curved in the arc of a circle and has a barb on its convex side. Said needle is clamped to an arm, *r'*, which is pivoted at *s'* (Figs. 2 and 15) to a fixed ear on the frame *a*, and is connected by a link, *t'*, with a slide, *u'*, (Fig. 2,) which is fitted to move in a vertical guide in the frame *a*, and is reciprocated in said guide by a cam-groove in a disk, *v'*, on the driving-shaft, the slide having a stud, *w'*, (Fig. 2,) entering said cam-groove. The needle is thus oscillated and caused to alternately enter and leave the work.

b' represents the looper-arm, which is formed on a hub, *c'*, mounted to oscillate on a stud, *d'*, attached to the lever *m*, carrying the back-gage *d*. Said hub has another arm, *e'*, having an orifice which receives a fixed stud, *f'*, on the frame *a*. Said stud, when the swing-piece is swinging backwardly to carry the feed-dog *c'* and gages *d* *t* to their starting position, as above described, causes the hub to partly rotate, and thus move the looper-arm sufficiently to cause it to throw the thread carried by it into the barb of the needle when the latter is projected through the work, as hereinafter described. The thread passes from the supplying-spool to the needle between adjustable tension-plates *g'* *g'*, (Figs. 2, 11, and 12,) on a stud, *h'*, affixed to the side of the frame *a*, from thence over a pulley, *i'*, on the take-up lever *j'*, then back over a pulley, *j'*, on the stud *h'*, beside the tension-plates *g'* *g'*, and then through the looper *b'*. The take-up lever *j'* is pivoted at *k'* to a fixed arm on the frame *a*, and has at its upper end a stud entering a cam-groove, *l'*, in the disk *m'*. Said lever is pressed by a spring, *m'*, in the direction indicated by the arrow in Fig. 2, its stud being thereby normally held in contact with one side of the cam-groove *l'*, said spring being interposed between an arm, *n'*, attached to the frame *a*, and a nut, *o'*, on a rod, *p'*, attached to the lever *j'*, and adapted to slide in an orifice in the arm *n'*. The cam-groove *l'* has a lateral enlargement at 2, (Figs. 1 and 19,) which comes to the point where the stud of lever *j'* enters said groove, as shown in Fig. 19, just as the needle commences to draw the loop through the upper and sole and permits the lever *j'* to yield, so that the tension of the spring *m'* is applied to the thread while it is being pulled through the upper and sole and until the stitch is drawn closely against the surface of the upper. After this the offset portion 3 of the cam-groove moves the lever *j'* to the position shown in Fig. 20, causing it to loosen the thread while the needle is completing the drawing out of the loop and while the loop is being cast off from the barb of the needle, after which the main portion 4 of the cam-groove moves the lever 2

to the position shown in Fig. 2, causing it to suddenly take up the loop and draw it tightly over the tongue on the sole.

q^2 represents the loop-spreader, which enters 5 and spreads the loop preparatory to the separation of the same from the barb of the needle by the cast-off. Said spreader is a curved arm having a longitudinal slot, into which the cast-off swings in separating the loop from the barb 10 of the needle, as presently explained. The spreader is attached to a slide, r^2 , which is fitted to reciprocate in a guide in a lever, s^2 , which is pivoted at t^2 to a fixed ear on the frame a and has its upper end engaged by a stud, u^2 , with 15 a cam-groove, v^2 , in a disk, w^2 , on the driving-shaft, the lever s^2 being thus oscillated and caused to oscillate the loop-spreader toward and from the needle. The spreader has, in addition to this oscillating movement, an up-and- 20 down movement, caused by the engagement of the slide r^2 by a link, a^3 , with a slide, b^3 , Figs. 17 and 18, which is fitted to slide vertically in a guide in the frame a , and has a stud, c^3 , which is engaged with a cam-groove, d^3 , in the inner 25 side of the disk w^2 . The cast-off e^3 is a bent wire arm attached to a rock-shaft, f^3 , which is journaled in bearings on the side of the spreader q^2 , and has at its upper end a crank, g^3 , the wrist-pin of which enters a slot in the lower 30 end of a lever, h^3 , which is pivoted to an ear, i^3 , on the slide r^2 , carrying the spreader, Figs. 17 and 18. The upper end of the lever h^3 has a pin, j^3 , which enters a cam shaped slot, k^3 , in an ear, l^3 , affixed to the lever s^2 . The lever h^3 35 is oscillated by said slot and pin when the slide r^2 is moved up and down by the means above described, and is thus caused to impart a rocking motion to the rock-shaft, whereby the cast-off is oscillated.

40 The successive movements of the loop-spreader and cast-off are as follows: During the latter part of the outward or backward movement of the needle the loop-spreader is swung forward under the needle, as shown in 45 Fig. 23, and then is somewhat depressed, as shown in Fig. 24, by the downward movement of the slide r^2 . At the same time the needle is moved slightly forward to release the loop, and then the cast-off is swung downwardly 50 upon the released loop and presses it downwardly from the needle. The point of the spreader now stands directly over the tongue on the sole, and while it stands in this position the take-up draws in the loop, which is 55 caused by the point of the spreader to tighten over the base of the tongue, Fig. 24. The spreader then swings back out of the way before the next forward movement of the knife.

m^3 represents a rest, which supports the work 50 below the point where the tongue and loop forming devices act thereon. Said rest is preferably a roller journaled on the swinging end of a lever, n^3 , which is pivoted at o^3 , Fig. 1, to the frame of the machine and is normally pressed 65 outwardly toward the operator by a spring, p^3 , attached at one end to said lever and at the

other end to a fixed ear on the frame a . The lever n^3 has a segmental arm, r^3 , containing a segmental slot, s^3 , through which passes a stud, u^3 , affixed to the frame a . On said stud is a 70 clamp or nut, v^3 , which is formed to bear against one side of the segmental arm r^3 , as best shown in Fig. 16.

The stud u^3 has a threaded portion, w^4 , on 75 which is a nut, v^3 , engaging said threaded portion. When the nut v^3 is turned in one direction on the stud u^3 , it is moved laterally by its screw-thread engagement therewith toward the segmental arm r^3 , and is caused to press the clamp or washer against the segmental arm, 80 thus pressing said arm against a boss, w^3 , on the frame a , the arm being thus gripped or clamped firmly, so that the rest m^3 is made rigid. When the nut is turned in the opposite 85 direction, it is moved away from and releases the segmental arm r^3 , so that the lever n^3 and rest m^3 are free to move, the segmental arm then sliding freely on the stud u^3 .

The means whereby the nut v^3 is turned to alternately hold and release the rest are an 90 arm, a^4 , formed on said nut, a lever, b^4 , pivoted at c^4 to the frame a and connected to the arm a^4 by a link, d^4 , a cam, e^4 , on the disk m^4 , and a spring, f^4 , which holds the upper end of the lever b^4 against the cam e^4 . The oscillations 95 of the lever b^4 , caused by the rotation of the cam e^4 and by the spring f^4 , turn the nut v^3 first in one and then in the opposite direction, so that the rest is alternately made yielding and non-yielding, the yielding periods coinciding with the feed movements of the work, 100 so that the rest is free to yield and conform to the variations in the contour of the surface of the upper, while the non-yielding periods take place while the tongue-cutting and loop forming 105 devices are acting on the work, so that the work is firmly supported when each tongue is being cut and the corresponding loop is being interlocked therewith. The length of the swinging movement of the swing-piece f , carrying 110 the back-gage, depth-gage, and feed-dog, may be varied to vary the length of the feed movement. To effect this variation I provide the swing-piece with an offset or ear, g^4 , Figs. 2 and 7, which is perforated to receive and slide 115 upon a stud or rod, h^4 , affixed to the frame a , the frame having at this point a socket, i^4 , which contains a part of said stud, and a spiral spring, j^4 , which bears against said ear g^4 and presses the ear against a wedge-shaped 120 collar or washer, k^4 , Fig. 7, mounted on said stud. Interposed between said wedge-shaped collar and a nut, m^4 , screwed onto the threaded outer end of the stud h^4 , is a vertically-movable forked wedge, n^4 , which bestrides the stud 125 and is supported by a rod, o^4 . The lower end of the rod o^4 may be supported by a treadle or other device to be operated by the foot of the operator. It will be seen that the wedge-shaped washer k^4 and the end of the fixed socket 130 i^4 constitute the stops that limit the oscillating movements of the swing-piece f , and that

by raising or lowering the wedge n^1 said washer may be moved toward or from the socket i^1 , thus effecting any desired variation in the length of the oscillating movements of the swing-piece and in the distance from tongue to tongue.

The shoe is presented by the operator, who presses the side of the upper near its margin against the back-gage, d , the rest m^1 at this part of the operation being loose or yielding, and resting against the side of the upper at a point below the gage d . The depth-gage d and fixed dog c' then descend simultaneously until the depth-gage bears on the sole close to its edge, and the feed-dog enters the sole slightly and clamps it against the back-gage.

The back-gage, depth-gage, and feed-dog then move laterally and feed the work, the rest m^1 being at the same time locked and made to constitute an unyielding rolling support for the side of the shoe. During the feeding movement the knife k' descends obliquely, and at the close of said movement enters the sole, cutting a tongue therein. The knife then withdraws from the path of the needle, and the latter descends, enters the incision last made by the knife, and passes through the between substance and the upper. While the needle is in the sole the back-gage moves away from the upper, and the depth-gage and feed-dog move away from the sole, and said parts move back to their starting position, and at the same time the looper is moved to throw the thread into the barb of the needle. The feed-dog, back-gage, and depth-gage next move to bear on the work, the back-gage and feed-dog clamping the work as before. The needle then withdraws from the work, drawing a loop of thread through the upper and the between substance. At the same time the take-up exerts a tension on the thread during the first part of the operation of drawing the loop, and then releases the thread and permits it to run loosely during the remaining part of the operation. After the loop is drawn out, the spreader q^2 moves forward into the loop and spreads it. The needle then moves slightly forward to release the loop, and the cast-off then swings over and removes the loop from the barb of the needle. The take-up lever then moves and takes up the loop, drawing it tightly across the tongue on the sole. The feed-dog, depth-gage, and back-gage then move and feed the work, and the operation already described is repeated, and so on.

I do not herein claim anything described and claimed in the above-named joint application of Joseph Coupal and myself for Letters Patent of the United States for sewing-machine for connecting soles and uppers, filed April 30, 1886, Serial No. 200,674.

I claim—

1. In a machine for connecting soles and uppers, the combination, with work-feeding and stitch or loop forming mechanism, substantially as described, of the segmental tongue-cut-

ting knife, a holder therefor mounted to oscillate in a plane which is oblique to the plane in which the needle moves, and mechanism for oscillating said holder, the arrangement being such that the knife when at the forward extreme of its movement stands in the path in which the needle moves, as set forth.

2. The combination, with the stitch or loop forming and the work-feeding mechanism, of the segmental tongue-cutting knife, the lever or holder carrying said knife and mounted to oscillate in a plane which is oblique to the plane in which the needle moves, and the cam, lever, and connecting-rod, whereby said knife-holder is oscillated, as set forth.

3. The combination, with the tongue-cutting and loop-forming mechanism, of the swing-piece or carrier, mechanism to oscillate it, the back-gage secured to a lever pivoted to said carrier, the feed-dog fitted to slide in a segmental slot in said carrier, and the slide p , fitted to reciprocate in said carrier and operatively connected with the feed-dog and with the lever supporting the back-gage, as described, and mechanism for reciprocating said slide, whereby the back-gage and feed-dog are moved alternately toward and from each other, as set forth.

4. The combination, with the tongue-cutting and stitch or loop forming mechanism, of the back-gage, the feed-dog, the mechanism whereby said gage and dog are operated, as described, and the depth-gage attached to the pivoted lever v , said lever having a curved slot, w , receiving a stud or pin on the slide p , which oscillates the back-gage and feed-dog, whereby the depth-gage is raised and lowered with the feed-dog, as set forth.

5. The combination, with the tongue-cutting and stitch or loop forming mechanism, of the swing-piece or carrier, the slide p , fitted to reciprocate therein, the feed-dog fitted to reciprocate in a segmental guide in the carrier, the spring-controlled crank journaled in the slide, and the connecting-rod journaled on the wrist-pin of the crank and pivoted to the feed-dog c' , said crank being normally held by its spring with its wrist-pin depressed, and adapted to be turned by hand against the pressure of said spring to raise the feed-dog, as set forth.

6. The combination, with the tongue-cutting and loop-forming mechanism, of the swing-piece or carrier, the slide p , fitted to reciprocate therein, the depth-gage, the lever v , supporting said gage, the spring-controlled crank journaled in the slide and having its wrist-pin a' engaged with a slot in said lever v , as set forth.

7. The combination, with the needle, the looper, and the take-up and operating devices therefor, of the loop-spreader, mechanism, substantially as described, for imparting thereto a combined oscillatory and vertical reciprocating movement, the cast-off composed of a bent finger and a rock-shaft, the latter

being journaled in bearings on the loop-spreader, and mechanism for oscillating the cast-off, as set forth.

8. The combination of the spring-supported
5 lever n^3 , having the rest m^3 and the segmental
slotted arm r^3 ; the fixed stud passing through
the slot of said arm, the nut v^3 , working on
the threaded outer end of the stud, and mechanism,
substantially as described, for oscillating
10 said nut and thereby causing it to alternately hold and release the rest, as set forth.

In testimony whereof I have signed my name to this specification, in the presence of two subscribing witnesses, this 31st day of January, 1887.

PETER A. COUPAL.

Witnesses:

C. F. BROWN,
A. D. HARRISON.