(No Model.) 13 Sheets—Sheet 1.

P. A. & J. COUPAL.

SEWING MACHINE FOR CONNECTING SOLES AND UPPERS.

No. 385,299. Patented June 26, 1888.

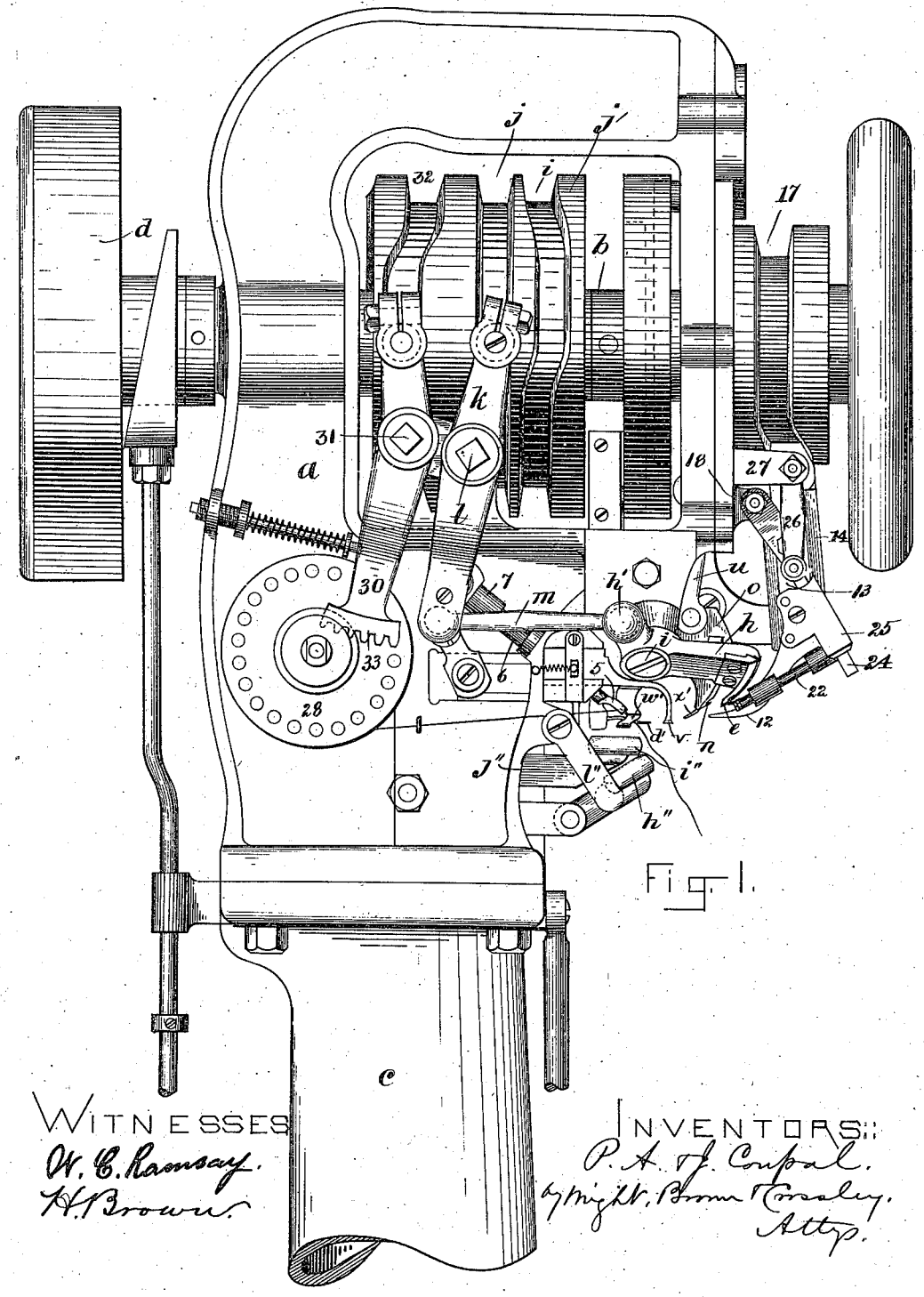


Fig. 1.

WITNESSES
W. C. Ramsay.
H. Brown.

INVENTORS:
P. A. & J. Coupal.
by Wright, Brown & Crosby,
Attys.

(No Model.) 13 Sheets—Sheet 2.

P. A. & J. COUPAL.

SEWING MACHINE FOR CONNECTING SOLES AND UPPERS.

No. 385,299. Patented June 26, 1888.

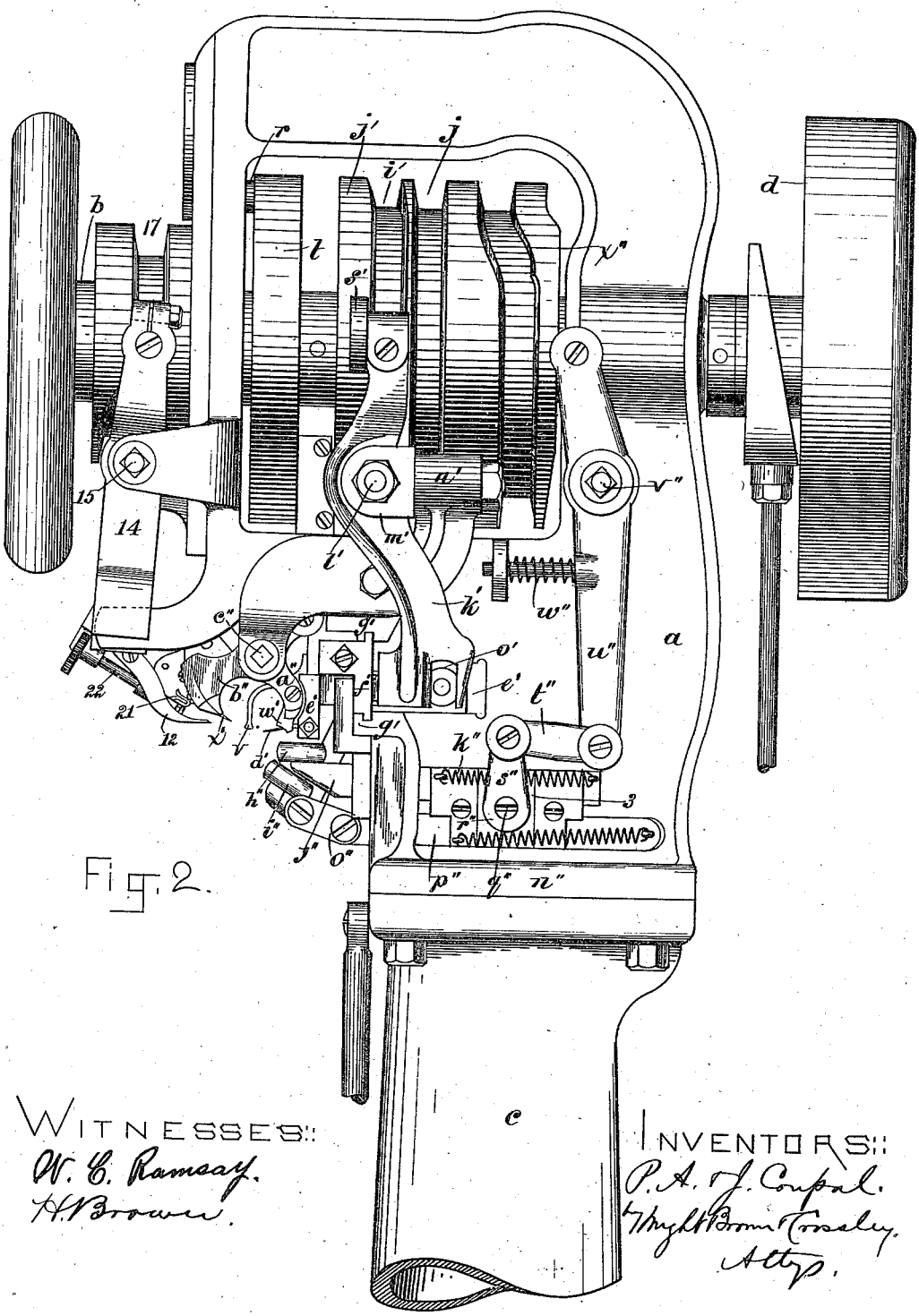


Fig. 2.

WITNESSES:
W. C. Ramsay.
H. Brower.

INVENTORS:
P. A. & J. Coupal.
by Wright Brown Quinby & Woodley.
Attys.

(No Model.) 13 Sheets—Sheet 3.

P. A. & J. COUPAL.

SEWING MACHINE FOR CONNECTING SOLES AND UPPERS.

No. 385,299. Patented June 26, 1888.

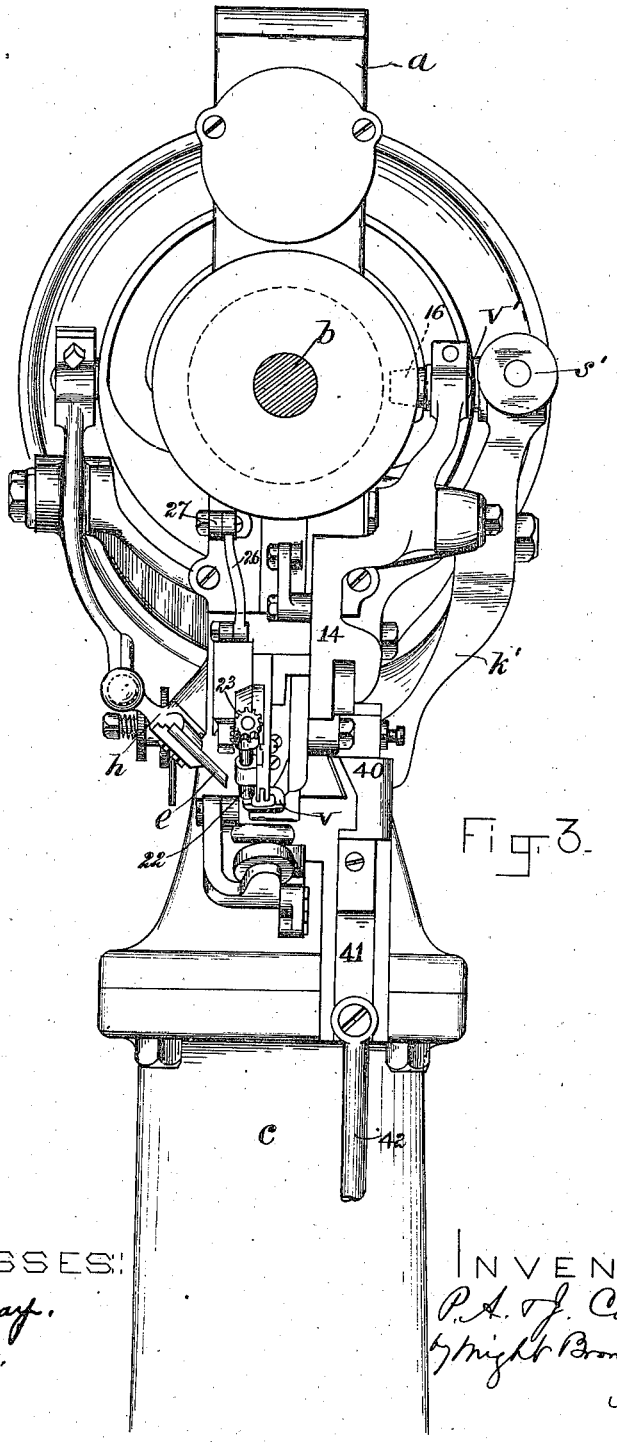


Fig. 3.

WITNESSES:
W. B. Ramsay.
H. F. Brown.

INVENTORS:
P. A. & J. Coupal
by Wright Brown Quinby & Woodley
Attys.

(No Model.) 13 Sheets—Sheet 4.

P. A. & J. COUPAL.

SEWING MACHINE FOR CONNECTING SOLES AND UPPERS.

No. 385,299. Patented June 26, 1888.

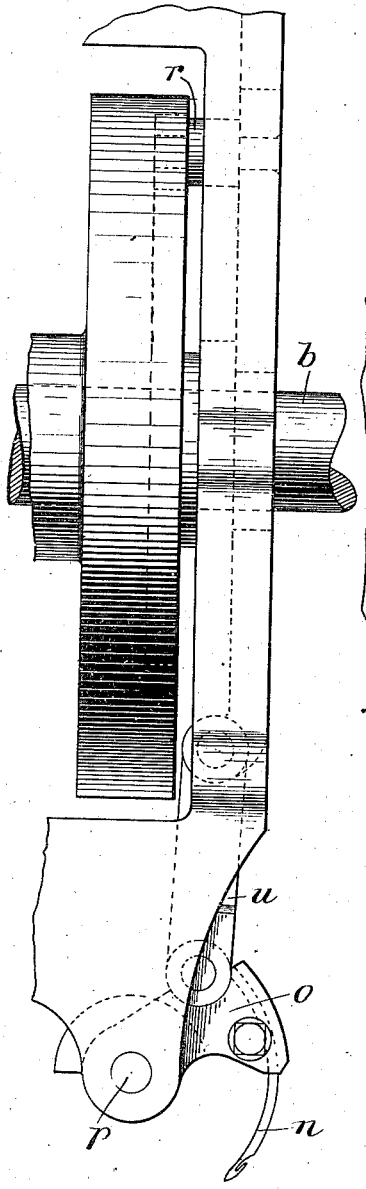


Fig. 4.

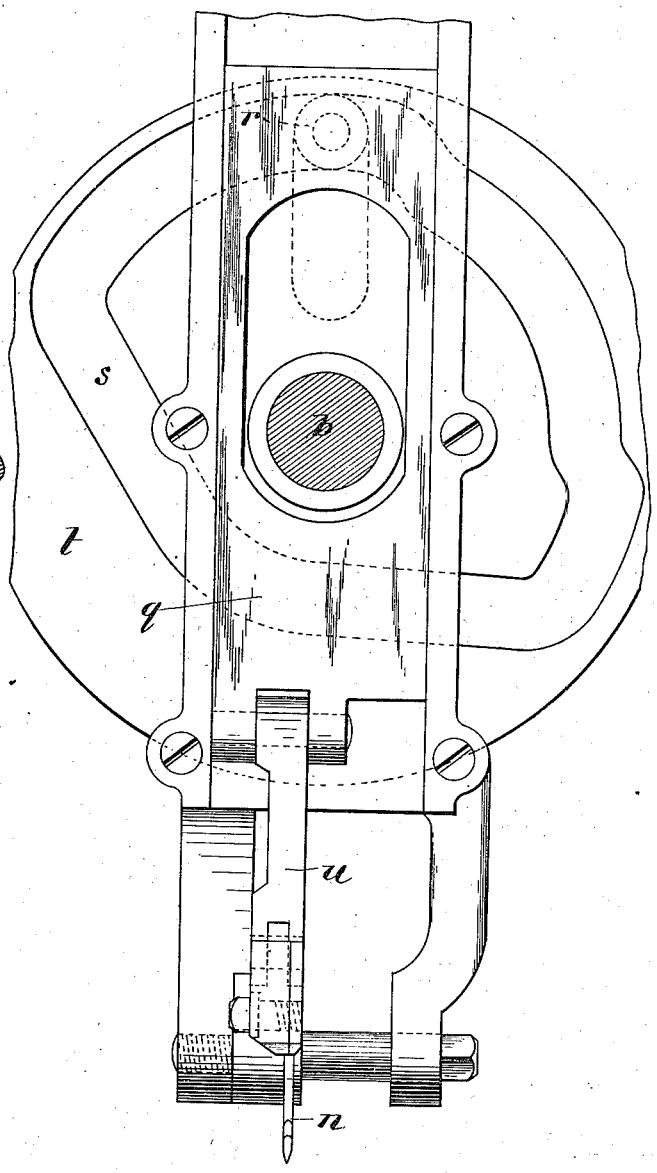


Fig. 5.

WITNESSES:
W. C. Ramsay.
H. Brown.

INVENTORS:
P. A. & J. Coupal.
by Wright Brown Quinby.
Attys.

(No Model.) 13 Sheets—Sheet 5.

P. A. & J. COUPAL.

SEWING MACHINE FOR CONNECTING SOLES AND UPPERS.

No. 385,299. Patented June 26, 1888.

Fig. 6.

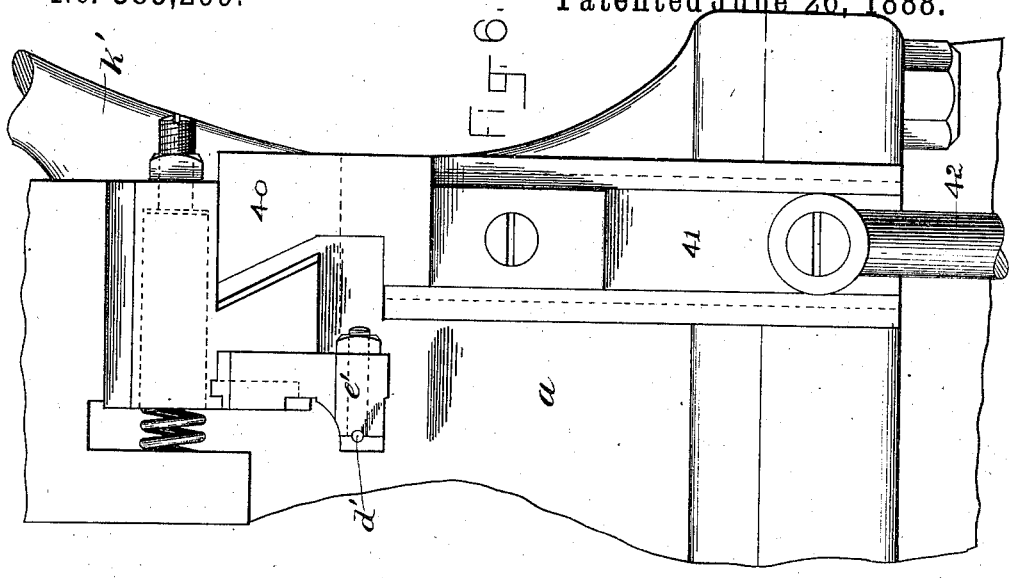
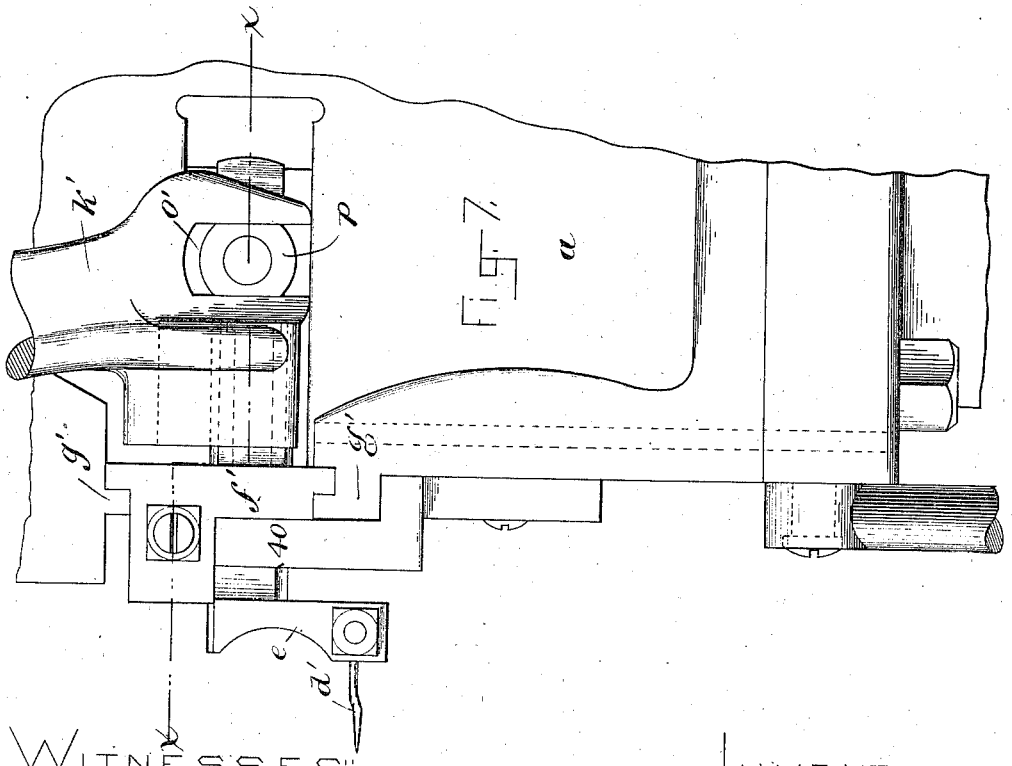


Fig. 7.



WITNESSES:
W. B. Ramsay.
H. Brown.

INVENTORS:
P. A. & J. Coupal.
by Wright, Brown, Crosby & Sheffield,
Attys.

(No Model.) 13 Sheets—Sheet 6.

P. A. & J. COUPAL.

SEWING MACHINE FOR CONNECTING SOLES AND UPPERS.

No. 385,299. Patented June 26, 1888.

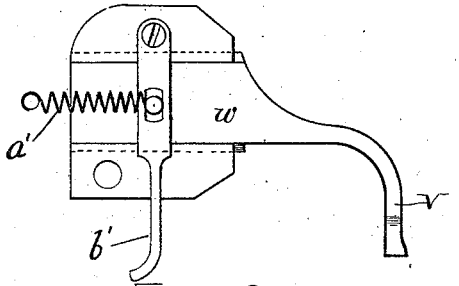


Fig. 9.

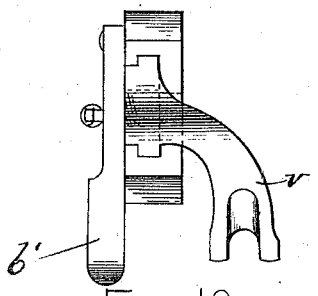


Fig. 10.

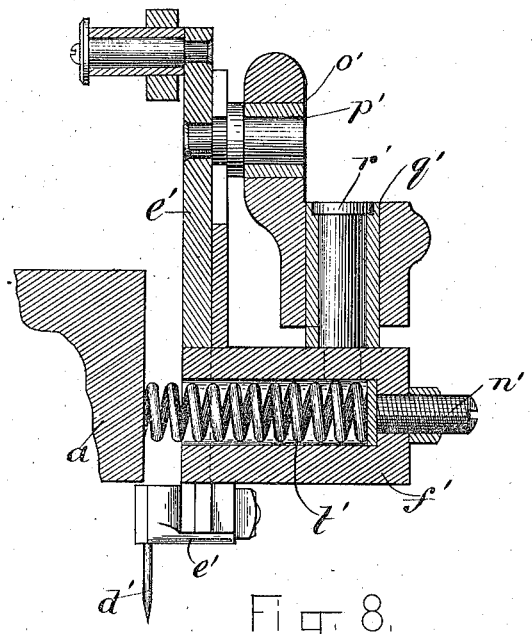


Fig. 8.

WITNESSES:
W. C. Ramsay.
H. Brown.

INVENTORS:
P. A. J. Coupal.
by Wright, Brown & Crosby.
Attys.

(No Model.) 13 Sheets—Sheet 7.

P. A. & J. COUPAL.

SEWING MACHINE FOR CONNECTING SOLES AND UPPERS.

No. 385,299. Patented June 26, 1888.

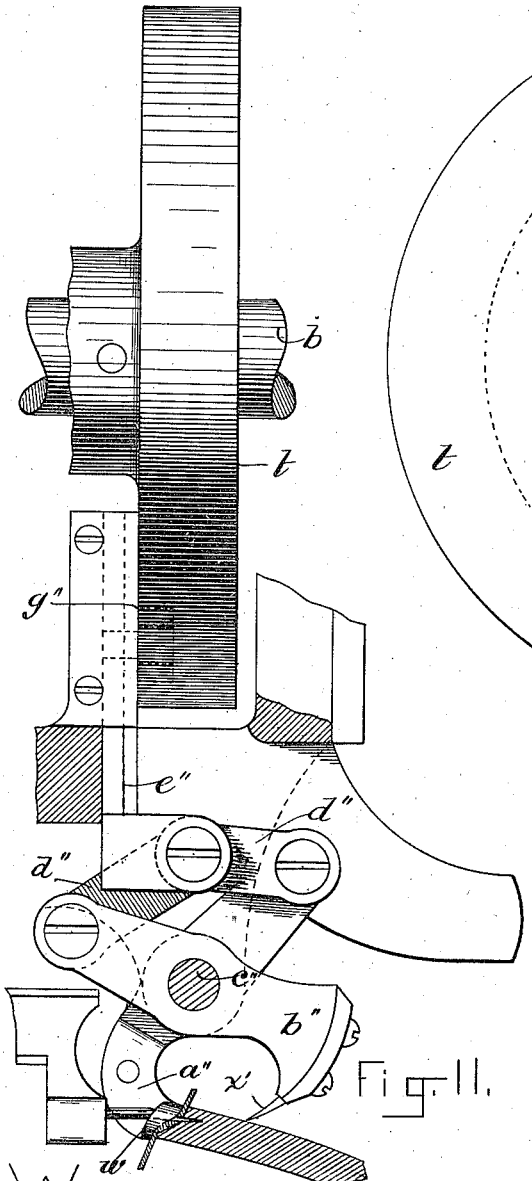


Fig. 11.

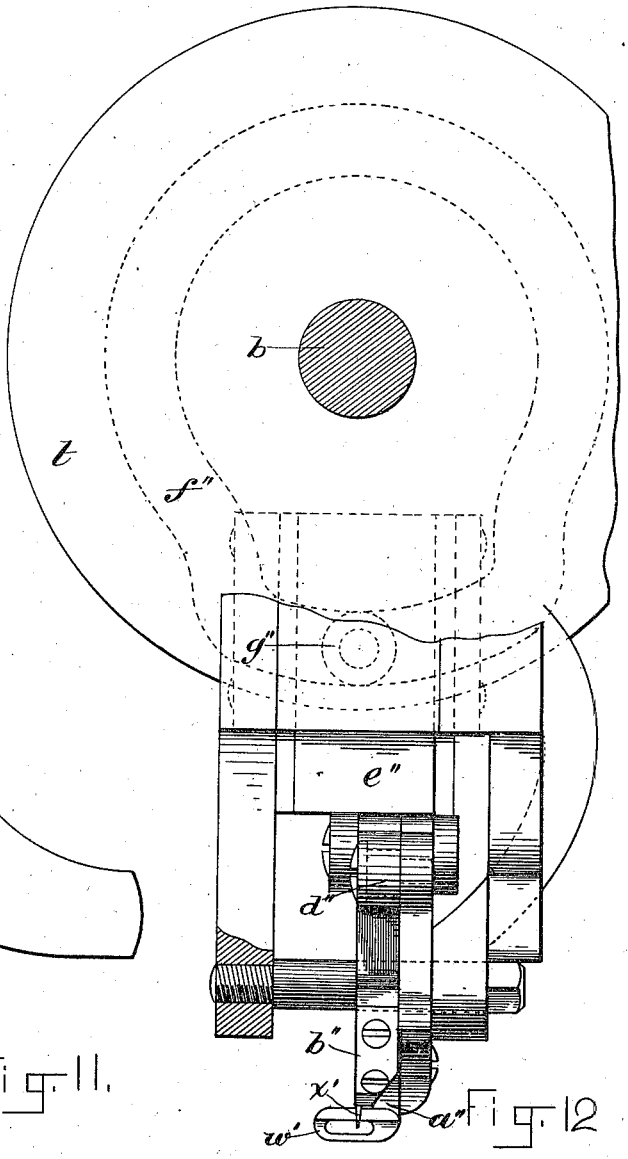


Fig. 12

WITNESSES:
W. C. Ramsay.
H. Brown.

INVENTORS:
P. A. & J. Coupal,
by Wright, Brown, Quinby & Ormsby,
Attys.

(No Model.) 13 Sheets—Sheet 8.

P. A. & J. COUPAL.

SEWING MACHINE FOR CONNECTING SOLES AND UPPERS.

No. 385,299. Patented June 26, 1888.

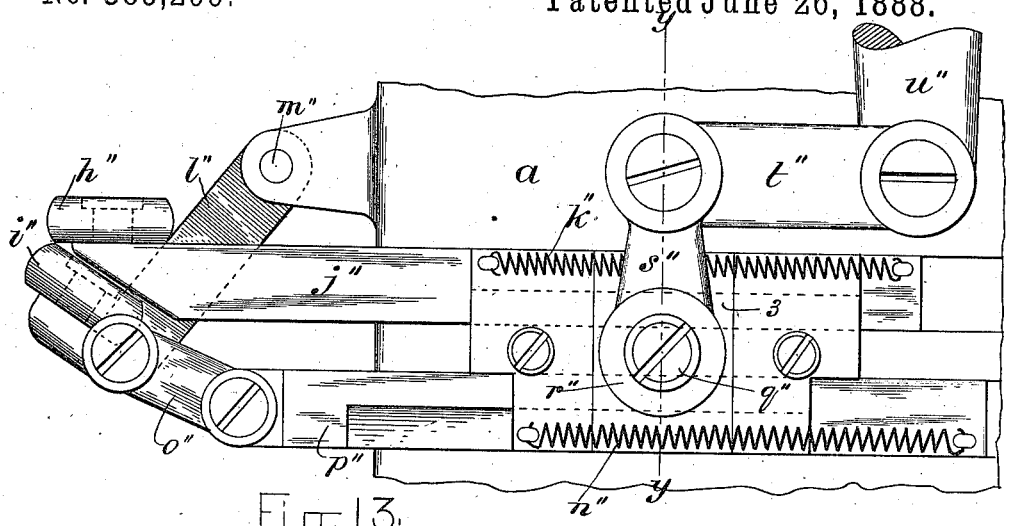


Fig. 13.

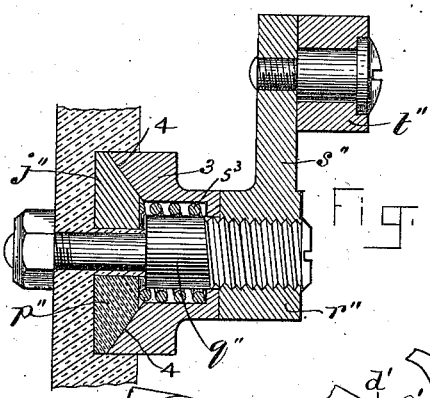


Fig. 14.

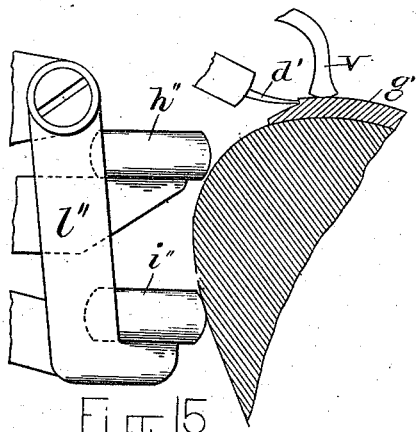


Fig. 15.

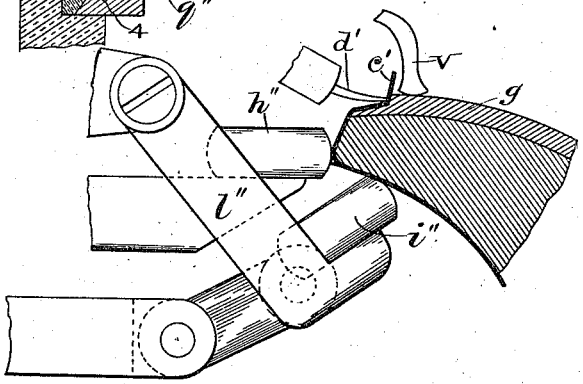


Fig. 16.

WITNESSES:

W. C. Ramsay.

H. Brown.

INVENTORS:

P. A. & J. Coupal.

by Wright, Brown & Quinby.

Attys.

(No Model.) 13 Sheets—Sheet 9.

P. A. & J. COUPAL.

SEWING MACHINE FOR CONNECTING SOLES AND UPPERS.

No. 385,299. Patented June 26, 1888.

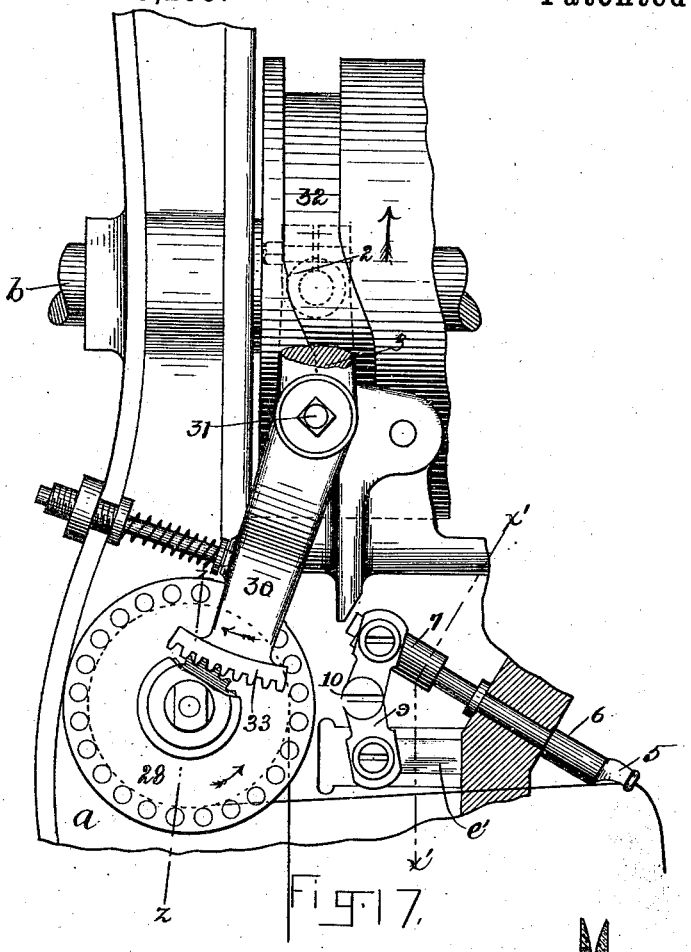


Fig. 17.

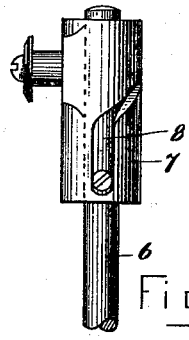


Fig. 20.

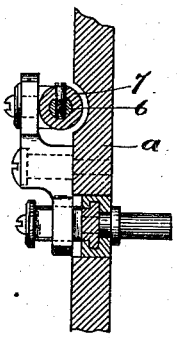


Fig. 19.

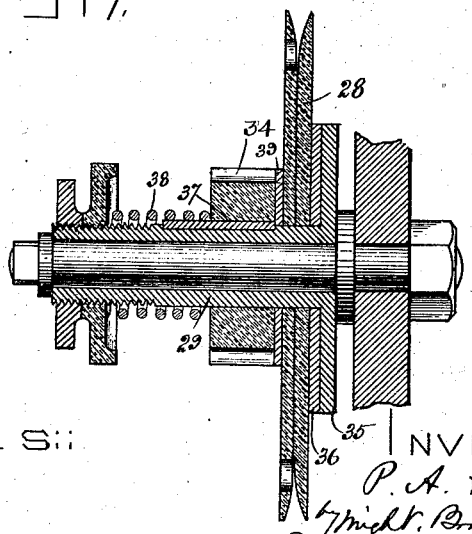


Fig. 18.

WITNESSES:
W. C. Ramsay.
H. H. Brown.

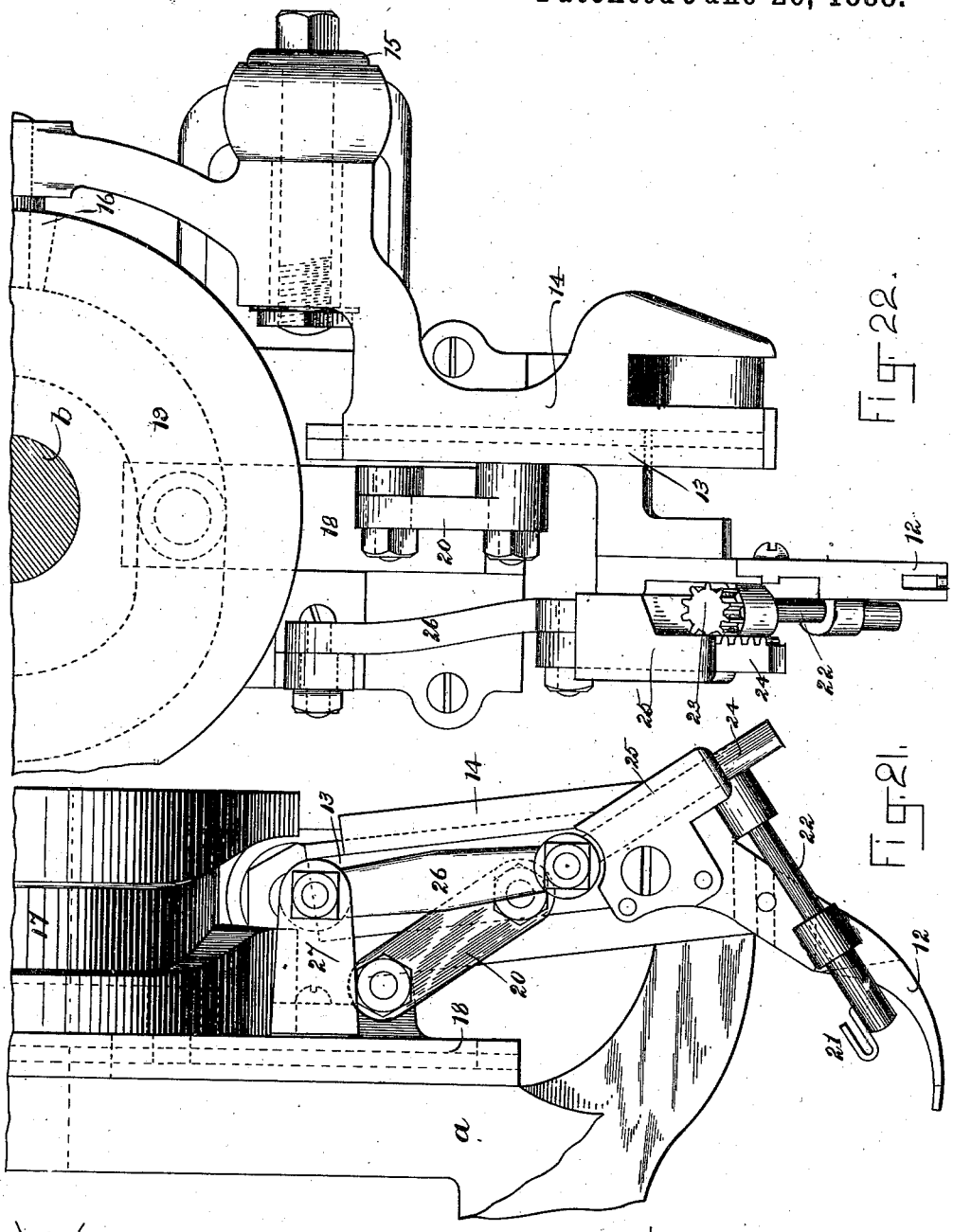
INVENTORS:
P. A. & J. Coupal.
by Wright, Brown, Quinby & Coupley.
Attys.

(No Model.) 13 Sheets—Sheet 10.

P. A. & J. COUPAL.

SEWING MACHINE FOR CONNECTING SOLES AND UPPERS.

No. 385,299. Patented June 26, 1888.



WITNESSES:
W. C. Ramsay.
H. Brown.

INVENTORS:
P. A. & J. Coupal.
by Wright, Brown & Quinby.
Attys.

(No Model.) 13 Sheets—Sheet 11.

P. A. & J. COUPAL.

SEWING MACHINE FOR CONNECTING SOLES AND UPPERS.

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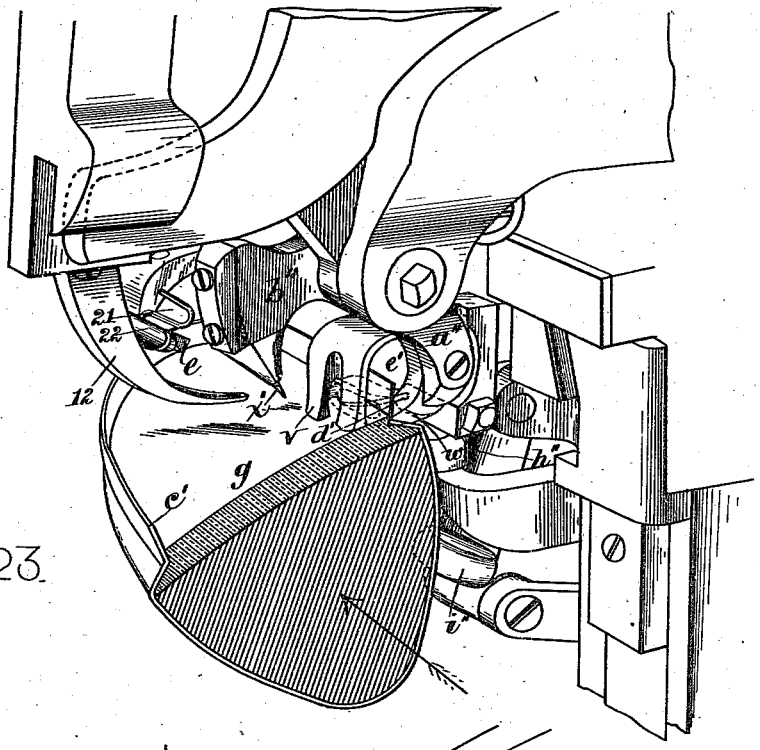

Fig. 23.

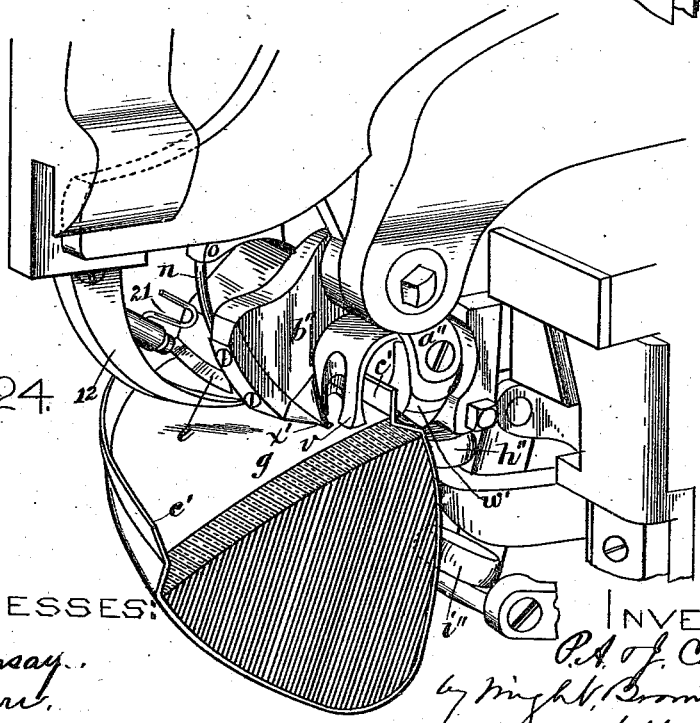

Fig. 24.

WITNESSES:
W. E. Ramsay.
H. Brown.

INVENTORS
P. A. & J. Coupal.
by Wright, Brown, Crosby, & Atty.

(No Model.) 13 Sheets—Sheet 12.

P. A. & J. COUPAL.

SEWING MACHINE FOR CONNECTING SOLES AND UPPERS.

No. 385,299. Patented June 26, 1888.

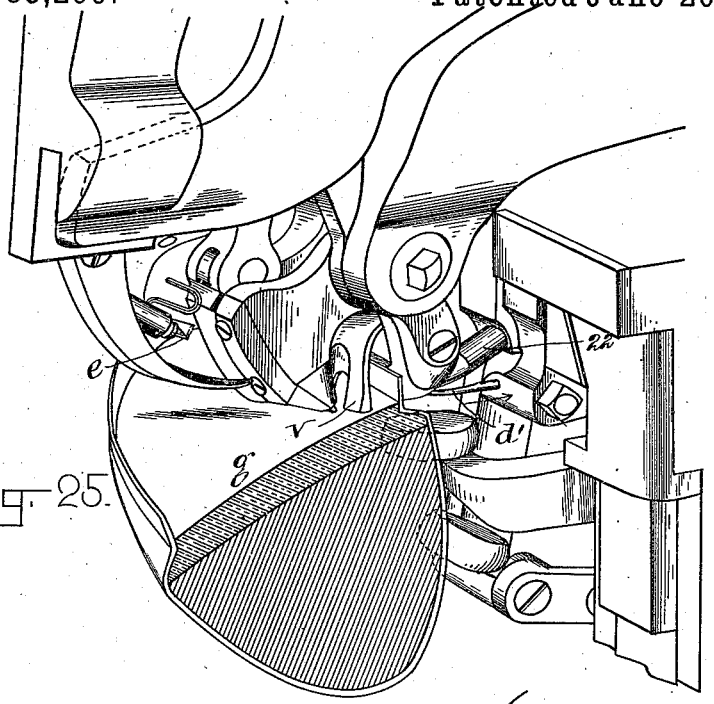

Fig. 25.

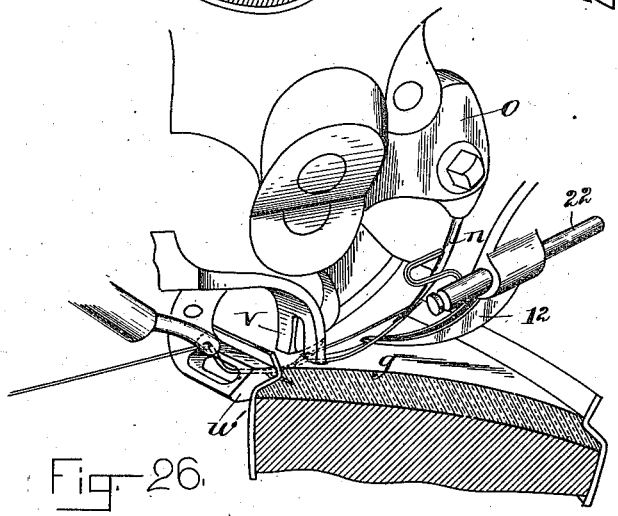

Fig. 26.

WITNESSES::
W. B. Ramsay.
H. Brown.

INVENTORS::
P. A. & J. Coupal
by Wright, Brown & Crosby.
Attys.

(No Model.) 13 Sheets—Sheet 13.

P. A. & J. COUPAL.

SEWING MACHINE FOR CONNECTING SOLES AND UPPERS.

No. 385,299. Patented June 26, 1888.

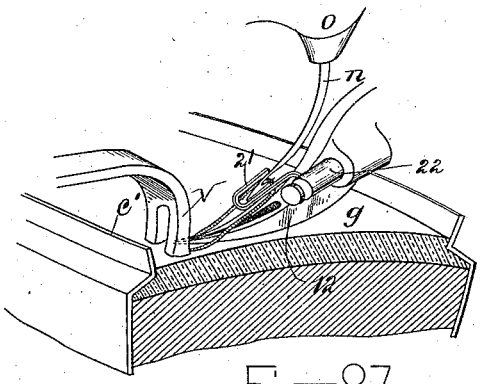

Fig. 27.

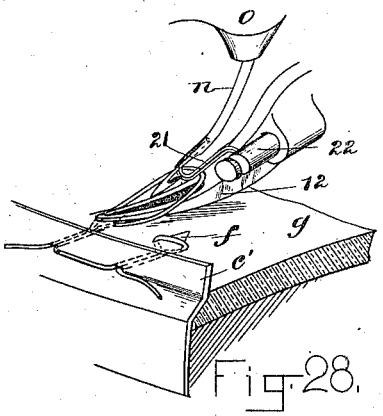

Fig. 28.

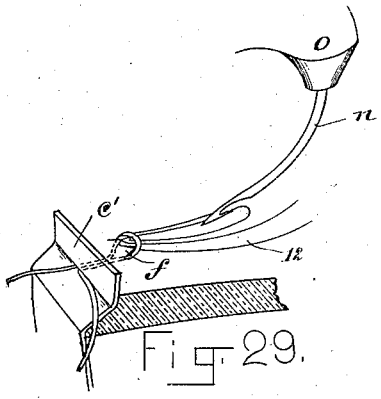

Fig. 29.

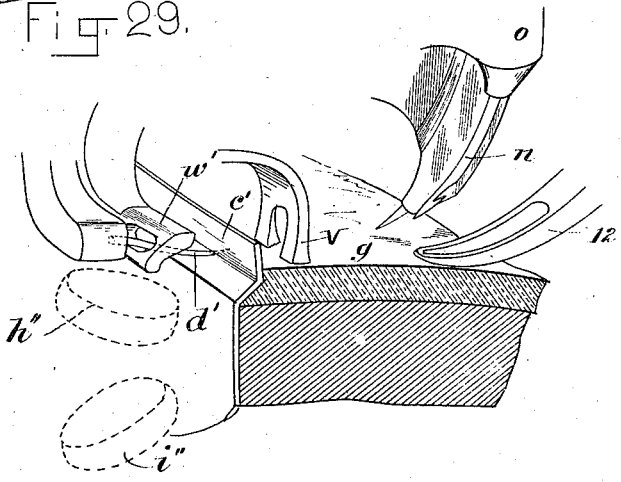

Fig. 30.

WITNESSES:
W. B. Ramsay.
H. Brown.

INVENTORS:
P. A. & J. Coupal.
by Wright Brown Quinby & Woodley.
Attys.

UNITED STATES PATENT OFFICE.

PETER A. COUPAL AND JOSEPH COUPAL, OF BOSTON, MASSACHUSETTS, ASSIGNORS TO THE LEATHER LOCK SEWING MACHINE COMPANY, OF PORTLAND, MAINE.

SEWING-MACHINE FOR CONNECTING SOLES AND UPPERS.

SPECIFICATION forming part of Letters Patent No. 385,299, dated June 26, 1888.

Application filed August 20, 1887. Serial No. 247,445. (No model.)

To all whom it may concern:

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

This invention relates to machines of the character shown in our pending application for Letters Patent for sewing-machine for connecting soles and uppers, filed April 30, 1886, Serial No. 200,674; and it 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 No. 242,328, granted to T. K. Keith, May 31, 1881.

Our invention consists in the combinations and improvements hereinafter described and claimed, whereby the tongues of leather are cut, the loops of thread are engaged therewith, the boot or shoe is fed after the engagement of each tongue and loop, and the shoe is supported during the operation.

Of the accompanying drawings, forming a part of this specification, Figures 1 and 2 represent side elevations of our improved machine. Fig. 3 represents a front elevation of the same. Figs. 4 to 22, inclusive, represent views of different parts of the machine, said figures being so referred to hereinafter as to render a separate description of them at this point superfluous. Figs. 23 to 30, inclusive, represent different parts of the operation of the machine.

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

In the drawings, *a* represents the head or frame in which the driving-shaft *b* is journaled, said head being supported by a standard or pedestal, *c*. The driving-shaft is rotated by power applied to a driving-pulley, *d*, which is normally loose on said shaft and is connected thereto by a clutch operated by the depression of a treadle at the base of the pedestal, the shaft being operatively connected with the driving-pulley so long as the treadle is held depressed by the operator and disconnected upon the release of the treadle. The clutch and means for operating it are old and well known in various types of machines, and as they form no part of our invention are not here particularly described. To the driving-shaft are affixed the series of cams which operate the various parts of the machine, as hereinafter described.

e represents the tongue-cutting knife, which, as here shown, is segmental and is V-shaped in cross-section, its cutting-edge being formed to cut a V-shaped tongue, *f*, Figs. 28 and 29, in the outer surface of shoe-sole *g*. The knife is attached by a clamp to a lever, *h*, which is mounted to oscillate in an oblique path on an oblique stud, *i*, Fig. 1, affixed to the head *a*. The path in which the knife moves is oblique to that in which the curved needle moves, the latter moving in a vertical plane, while the knife moves in a plane at an angle of about forty-five degrees. The knife-carrying lever *h* is operated by a cam-groove, *j*, a lever, *k*, pivoted at *l* to a fixed lug on the head *a*, and having at its upper end a roller entering the cam-groove *j*, and a rod, *m*, connecting the lower end of the lever *k* with an arm, *h'*, on the knife-carrying lever *h*. The rod is connected to the lever and arm by balls formed on the ends of the rod and sockets formed in said lever and arm to receive said balls.

The needle *n* is attached to a needle-arm, *o*, which is pivoted at *p*, Fig. 4, to fixed ears on the head *a*, and is oscillated in a vertical plane by means of a slide, *q*, Fig. 5, fitted to slide in a vertical guide in the head *a*, and provided with a roller, *r*, Figs. 4 and 5, and a cam-groove, *s*, in a disk, *t*, on the driving-shaft, said groove receiving the roller *r*, and a link or rod, *u*, connecting the lower end of the slide *q* with an ear on the needle-arm. The rotation of the cam *t* reciprocates the slide *q* vertically and causes the latter to oscillate the needle. The relative arrangement and time of operation of the knife and needle are such that the needle moves forward after the knife has cut a tongue in the work and then receded therefrom, the needle entering the cut made by the knife and

passing under the tongue formed by said cut and through the edge of the sole and the upper bearing against said edge, so that the loop of thread drawn back by the needle through the upper and the edge of the sole will be in position to interlock with the tongue, as hereinafter described.

v represents a rest against which the upper surface of the sole is held by the operator during the operation of the machine. Said rest we term a "depth-gage," and its office is to determine the depth of the entrance of the feeding and perforating awl, hereinafter described, and the needle into the sole.

The depth-gage is formed on a slide, *w*, which is adapted to move toward and from the front of the machine in a fixed guide, and is normally held back by a spring, *a'*. A lever, *b'*, Figs. 1 and 9, is provided, whereby the operator can move the depth-gage forward for the purpose of placing the upwardly-projecting edge *c'* of the upper between said gage and the feeding-awl *d'*. Said awl, which is an important part of our invention, is affixed to an arm, *e'*, which is adapted to reciprocate horizontally in a slide or carrier, *f'*, which in turn is adapted to reciprocate in fixed guides *g' g'* on the head *a*. The said block and slide are moved alternately to give the awl the following motions: first, a forward lengthwise motion to cause it to penetrate the work; secondly, a forward lateral motion while it is engaged with the work, whereby the latter is fed; thirdly, a backward lengthwise motion to withdraw it from the work after the feed movement, and, fourthly, a backward lateral motion while it is withdrawn from the work, whereby it is returned to its starting position. These motions are effected by a cam, *j'*, a cam-groove, *i'*, both rotated by the driving-shaft, and a lever, *k'*, which is pivoted at *l'* to ears *m'*, Fig. 2, on a stud swiveled in a fixed bearing, *n'*, so that the lever can oscillate in two planes at right angles to each other—viz., on the pivot *l'* and on the axis of the ears *m'*. The lower end of the lever *k'* has a slot, *o'*, receiving a stud, *p'*, on the block *e'*, and another slot, *q'*, receiving a stud, *r'*, on the slide *f'*, the slot *o'* and stud *p'* being at right angles with the slot *q'* and stud *r'*. The cam *j'*, acting on a roller, *s'*, on the lever *k'*, gives said lever the movement which causes it to move the slide *f'*, block *e'*, and awl *d'* in the direction required to feed the work, while a spring, *t'*, Fig. 8, interposed between a part of the head *a* and an adjusting-screw, *u'*, on the slide *f'*, presses said slide in the opposite direction, keeping the roller *s'* in contact with the cam *j'* and giving the awl its backward lateral movement. The cam-groove *i'*, acting on a roller, *v'*, Fig. 3, on the lever *k'*, moves the lever in the directions required to give the block *e'* and awl *d'* the forward and backward movements lengthwise of the awl. The work is grasped while the knife is cutting the tongue and during the forward and backward movements of the needle by a supporting-jaw or back gage, *w'*, which is arranged to bear against the portion of the upper that bears on the edge of the sole, and a penetrating-jaw or pointed dog, *x'*, arranged to penetrate the upper surface of the sole between each tongue cut by the knife and the point where the next tongue is cut, the dog being in advance of the knife and outside or in front of the depth-gage, while the back gage is behind the depth-gage and resists the thrust of the jaw *x'* against the work. The jaw or dog, by reason of its form and direction of movement, draws the sole upwardly against the depth-gage when it penetrates the sole.

The jaws *w' x'* are affixed, respectively, to levers *a'' b''*, which are both pivoted at *c''* to a fixed ear on the head *a* and have their upper ends connected by links *d'' d''*, Fig. 11, to the lower end of a slide, *e''*, which is movable in a vertical guide in the head *a*, and is reciprocated by a cam-groove, *f''*, in the disk *t* on the driving-shaft, said groove receiving a roller, *g''*, on the slide *e''*. The links *d'' d''* and levers *a'' b''* constitute a lazy-tongs operated by the upward movement of the slide *e''* to move the jaws *w' x'* toward each other and cause them to grasp and hold the work, and by the downward movement of said slide to separate said jaws and release the work.

In addition to the depth-gage *v* and jaws *w' x'* as work-supporting devices, we have provided two automatically-adjusted rests, *h'' i''*, arranged to bear on the side of the upper at different heights, the upper rest, *h''*, being under and close to the awl, while the rest *i''* is at a lower point.

The rest *h''* is a horizontal roller supported by a slide, *j''*, adapted to move horizontally in a guide or way on the head *a* and normally pressed forward by a spring, *k''*, Figs. 2 and 13, which presses the rest outwardly toward the operator and permits it to yield as may be required by variations in the contour of the upper.

The lower rest, *i''*, is attached to an arm, *l''*, which is pivoted at *m''* to an ear affixed to the head *a*, and is adapted to oscillate, so as to give the rest *i''* a movement in the arc of a circle, whereby said rest is depressed when it is moved backward and raised as it is moved forward. This movement adapts the rest *i''* to support the thinner toe portion of the shoe, as shown in Fig. 16, as well as the side portions, as shown in Fig. 15. The lever *l''*, supporting the rest *i''*, is connected by a link, *o''*, with a slide, *p''*, which is parallel with the slide *j''*, and, like the latter, is adapted to slide horizontally in a guide or way, and is pressed forward by a spring, *n''*, whereby the rest *i''* is normally held in the position shown in Figs. 1, 2, and 13, and is permitted to move backwardly and downwardly from said position, as shown in Figs. 15 and 16.

An important part of our invention is the provision of means for automatically locking the rests *h'' i''* in any position they may assume, and causing them to act as rigid sup-

caused by the thread-pulling rotation of the tension-wheel after the slack has been entirely taken up, the operator pulling off the thread in preparing the machine for operation to remove any thread on which the wax has dried or hardened. The sleeve 29 has a flange, 35, faced with a washer, 36, of felt or other frictional material, against which one side of the tension-wheel bears. The gear 34 is connected to the sleeve 29 by a key, 37, which causes the sleeve and gear to rotate together, but permits the gear to move lengthwise of the sleeve. The gear is pressed by a spring, 38, toward the tension-wheel, and a frictional washer, 39, is interposed between the gear and wheel. The wheel is thus adapted to rotate independently of the gear, and while the spring-pressed gear and the frictional washers prevent such independent rotation during the regular operation of the machine they permit it when unusual strain is exerted on the thread, as by the operator pulling it from the wheel.

Operation: The feed-awl being projected and the rests *h″ i″* unlocked and free to yield, the operator places the shoe in position for the stitching operation, first moving the depth-gage outwardly by means of the lever *b′* and keeping the bottom of the sole against depth-gage, pressing the shoe inwardly against the awl, so that the latter penetrates the upper and the edge of the sole. The awl is at this time about at the center of its feeding movement from right to left, and upon the starting of the machine the awl completes its feeding movement, carrying the work to the left and completing the feed movement. The jaws *w′ x′* then approach each other, the penetrating-jaw *x′* entering the outer surface of the sole a little to the right of the awl and pressing the work against the supporting-jaw *w′*, and at the same time drawing the work upwardly against the depth gage. The work is now held jointly by the jaws *w′ x′* and the awl *d′*. The rests *h″ i″* are locked and made rigid by the described locking devices just before the knife commences to cut and remain locked during the entire operation of cutting the tongue, drawing the loop of thread through the work, casting off the loop, and taking it up to interlock it with the tongue, said supports being released and made yielding only while the work is being fed, so that they conform to all the variations in the cross-section of the lasted shoe while the latter is being fed, and are immediately locked in each position they assume, and therefore constitute a firm support for the shoe until it is again fed. After the completion of the feed movement the knife descends and cuts a tongue in the sole, and the awl as the knife advances retreats to prevent the knife from striking it. The tongue is formed so that the hole made by the awl enters the cut made by the knife in forming the tongue. The knife retreats after cutting the tongue, and the needle advances and passes under the tongue and into the awl-hole, the awl retreating meanwhile to avoid the needle. While the needle is entering the stock the looper swings down to bring the thread under the needle, and at the same time the awl, which has now entirely withdrawn from the work, moves laterally to the left. The looper now swings upwardly and throws the thread across the barb of the needle, and at the same time the awl moves outwardly and penetrates the work at a distance equal to the length of one stitch from the needle. The needle then moves back, drawing a loop of thread through the work. While the needle is drawing the thread through the upper and sole the cam 32 moves the lever 30 and the tension-wheel 28 in the direction indicated by the arrows in Fig. 17, thus relieving the thread of tension. The intermission of the tension thus effected lasts until the barb of the needle has drawn the thread through the work, and by relieving the strain on the needle during this part of its work greatly diminishes the liability of breaking the thread. After the barb of the needle has emerged with the loop from the work the tension-wheel is rotated in the opposite direction sufficiently to exert a tension on the thread during the latter part of the operation of drawing out the loop. This tension tightens the thread on the outside of the upper between the last stitch and the one being formed. After the loop has been entirely drawn back the tension on the thread is released. While the needle is drawing out the loop the spreader is moved forward under the needle. When the loop is entirely drawn, the spreader is depressed and bears upon the sole, the point of the spreader bearing on the root or base of the tongue last formed. This downward movement of the spreader causes the pinion 23 of the cast-off bar to move over the rack and be rotated by said rack, this movement swinging the cast-off across the point of the needle and causing it to bear on the loop. Just as the cast-off moves below the needle the latter moves slightly forward to release the loop, which is then depressed and separated from the needle by the continued downward movement of the cast-off. After the casting off of the loop the tension-wheel is rotated to tighten the stitch over the tongue, the loop spreader remaining on the tongue during this operation in position to cause the loop to slip off from its point at the extreme base of the tongue, so that there is no possibility of the loop being laid sufficiently near the free end of the tongue to make it liable to slip off from the tongue.

It will be observed that tension is exerted on the thread, first, to tighten that part which lies at the outside of the upper, and, secondly, to tighten the loop across the tongue on the surface of the sole, so that all parts of the loops or stitches are drawn tight and a close union between the upper and sole is effected.

The feeding-awl arranged outside of the shoe insures the practically-equal spacing of the tongues at their bases or roots, so that the stitch-interlockings of the thread-loops with the tongues are at uniform distances

ports for the upper during the operation of cutting the tongues in the sole, and of drawing the loops of thread and interlocking them with said tongues. The rests are thus locked just after the work is fed by the awl, and remain locked until just before the next feed movement, when they are unlocked and allowed to conform to the shape of the portion of the upper presented to them by the feed movement.

The mechanism employed for locking and releasing the rests h'' i'' may be variously modified. The mechanism here shown is as follows: Figs. 2, 13, and 14 represent a bolt, q'', affixed to the head and located between the slides j'' p'', which carry the rests. The bolt is screw-threaded at its outer portion, and on said threaded portion is a nut, r'', having an arm, s'', formed on it. Said arm is connected by a link, t'', with one end of a lever, u'', which is pivoted at v'' to the head a, and has at its opposite end a roller which is held by a spring, w'', Fig. 2, against a cam, v'', on the driving-shaft, said lever being oscillated by the cam and spring and turning the nut first in one direction and then in the other on the fixed bolt q''. Between the nut r'' and the slides j'' p'' is interposed a clamp, 3, made tubular at one end to bear against the inner end of the nut r'', and provided at its other end with two clamping-faces, 4 4, formed to bear against the outer surfaces of the slides j'' p''. Said faces and the outer surfaces of the slides are preferably milled or corrugated, so that when the clamp is forced against the slides by the rotation of the nut it will firmly lock said slides. It will be seen that when the nut r'' is turned in one direction it will cause the clamp 3 to lock the slides j'' p'' and their rests, and when turned in the opposite direction will release said slides. A spring, s^3, may be employed to separate the clamp from the slides when the nut releases the clamp.

5 represents the looper-arm (best seen in Fig. 17) which places the thread across the barb of the needle when the latter is projecting through the stock. Said arm is attached to the looper-bar 6, which is journaled in a bearing in the head a, and is oscillated in said bearing by a sleeve, 7, which has a curved slot, 8, Fig. 20, receiving a stud on said bar. Said sleeve is reciprocated on the looper-bar by a lever, 9, Fig. 17, pivoted at 10 to the head a, and connected at one end to the sleeve 7 and at the other end to the awl-carrying bar e'. The movements of said bar oscillate the lever 9 and cause the latter to reciprocate the sleeve 7, the slot of which, acting on the stud of the looper-bar, rocks the latter at the proper times.

12 represents the loop-spreader, which enters the loop drawn out by the needle preparatory to the operation of casting off the loop from the needle. Said loop-spreader is a curved arm rigidly attached to a slide, 13, which is adapted to move in a guide-lever, 14. Said lever is pivoted at 15 to a fixed ear on the head a, and has at its upper end a roller, 16, entering a cam-groove, 17, which oscillates the lever on its pivot and causes it to oscillate the loop spreader toward and from the work. The loop-spreader has also an upward-and-downward movement imparted by a slide, 18, adapted to move vertically in a guide in the head a, a cam-groove, 19, Fig. 22, receiving a roll on the slide 18, and a link, 20, connecting the slide 18 with the loop-spreader-carrying slide 13.

The cast-off 21 is a bent-wire arm attached to a rock-shaft, 22, which is journaled in bearings on the side of the spreader 12, and has on its upper end a pinion, 23, which meshes with a rack, 24. Said rack is fitted to slide in a guide, 25, attached to the loop-spreader 12, and is connected by a link, 26, with a fixed ear, 27, on the head a. The upward and downward movements of the loop-spreader cause the rack 24, which does not move up and down, to rotate or rock the pinion 23 and thus oscillate the cast-off.

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 Fig. 26, and then is somewhat depressed, as shown in Fig. 27, by the downward movement of the slide 13. At the same time the needle is moved slightly forward to release the loop, and then the cast-off is swung downwardly upon the released loop and presses it downwardly from the needle, as shown in Fig. 28. 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 caused by the point of the spreader to tighten over the base of the tongue, Fig. 29. The spreader then swings back out of the way before the next forward movement of the knife.

28 represents a grooved tension wheel, which is adapted to rotate on a sleeve, 29, Fig. 18, which is mounted on a stud affixed to the head. Said wheel is rotated alternately in opposite directions by means of a lever, 30, pivoted at 31 to a fixed ear on the head a, a cam-groove, 32, in a disk on the driving-shaft, said groove receiving a roller on one end of said lever and oscillating the lever, a rack, 33, on the opposite end of the lever 30, and a gear, 34, connected with the tension-wheel and meshing with said rack. The cam is timed to oscillate the lever 30 and cause the rack and gear to rotate the tension wheel to loosen the thread while it is being drawn through the material by the needle and tighten it to take up the stitches, as hereinafter explained.

The tension-wheel is adapted to rotate independently of the gear, and is connected therewith by friction devices, which, while causing the wheel to rotate with the gear in the operation of the machine, when the thread is not under unusual strain, permits it to be independently rotated by strain on the thread

apart all around the shoe. Heretofore in machines for doing this work the feed-dog has been arranged to act on the upper surface of the sole within the margin of the upper, and the consequence of said arrangement was the wider separation of the bases of the tongues at the toe and heel than at the side portions, so that the connection of the upper to the sole was not so close at the toe and heel. This objection is obviated by our improved outside feed.

The depth gage is arranged to support the upper surface of the sole directly over the point where the awl enters the sole preparatory to feeding it. The lateral extension of said gage enables it to firmly support the shoe and prevent it from tipping lengthwise, so that each awl-hole is made at a uniform depth. The capability of the depth gage to move outwardly enables the projecting edge of the upper to be readily placed behind the depth-gage in presenting the shoe to the machine.

The movement of the awl effected by the spring *t'*, whereby the awl is carried backwardly preparatory to entering the shoe to feed the same, is arrested by a wedge, 40, affixed to a slide, 41, which is vertically movable in guides in the head *a*. Said wedge is connected by a rod, 42, with a treadle, (not shown,) whereby it may be depressed to arrest the described movement of the awl at any desired point, and thereby regulate the length of the stitches or the distance between the tongues.

In our pending application above referred to several of the combinations which we elect to claim in this application are shown and described.

The tongue cutting knife may be arranged to act at a distance from the point where the needle acts without departing from the spirit of our invention as herein claimed.

We claim—

1. The combination of suitable work-supporting devices, a tongue-cutting knife, mechanism to move said knife to and from a sole supported by said work-support, a feeding device to feed the work intermittingly, a curved oscillating needle arranged to enter the incisions made by the tongue-cutting knife, a looper, a cast-off, and tension devices co-operating with said needle, whereby loops of thread are engaged with the tongues cut by the knife, as set forth.

2. The combination of the tongue forming knife, mechanism to oscillate it, the loop-forming mechanism, the awl arranged to penetrate the outer surface of the shoe, and mechanism for operating the awl, whereby the latter is moved first to penetrate the work, then to feed the same, then to withdraw from the work, and finally to return to its starting position, as set forth.

3. The combination of the tongue-forming knife, mechanism to oscillate it, the loop-forming mechanism, the awl arranged to penetrate the outer surface of the shoe, and mechanism to operate said awl, whereby it is caused to feed the work, and the depth-gage, whereby the depth of penetration of the awl and knife is determined, as set forth.

4. The combination of the tongue-forming knife, mechanism to oscillate it, the loop-forming mechanism, the depth-gage adapted to slide horizontally, a spring whereby said gage is normally retracted, and a handle whereby said gage may be moved forward to admit the edge of the upper behind it, as set forth.

5. The combination of the tongue-forming knife, mechanism to oscillate it, the loop-forming mechanism, a normally-yielding rest, as *i''*, for the side of the upper, and means, substantially as described, whereby said rest is locked and made rigid during the tongue and loop forming operations, as set forth.

6. The combination of the tongue-forming knife, mechanism to oscillate it, mechanism, substantially as described, for forming loops of thread and interlocking them with the tongues formed by the knife, a normally-yielding spring-projected rest, *h''*, arranged to bear on the upper near the sole, a second normally-yielding spring-projected rest, as *i''*, arranged to bear on the upper below the other rest, a pivoted lever supporting the rest, whereby the latter is raised and lowered when it is moved forward and back, and means, substantially as described, whereby said rests are locked and made rigid during the tongue and loop forming operations, as set forth.

7. The combination of the tongue-cutting knife, mechanism to oscillate it, the loop-forming and interlocking mechanism, the perforating and work-feeding awl and its operative mechanism, the jaws *x' w'*, adapted the one to penetrate the surface of the sole and the other to support the side of the upper, and mechanism to operate said jaws, substantially as described.

8. The combination, with the feeding mechanism and the complementary stitch-forming mechanism, of the loop-spreader, the slide 13, supporting the same, the lever 14, carrying said slide, mechanism for oscillating said lever, mechanism for reciprocating the slide independently, the cast-off bar journaled in bearings on the loop-spreader and provided with a pinion at one end and a cast-off, 21, at the other end, a rack, 24, adapted to slide in a guide on the loop-spreader, and a connection, 26, between said rack and a fixed support whereby the rack is caused to oscillate the cast-off when the loop-spreader is raised and lowered, as set forth.

9. The combination, with the tongue-forming and stitch-forming mechanisms, of the depth-gage arranged to bear on the outer surface of the sole, and a pointed dog or jaw formed and arranged to penetrate said surface, and mechanism for oscillating said dog, whereby it is caused to hold the sole against the depth-gage, as set forth.

10. The combination, with the tongue-forming and stitch-forming mechanisms, of the pointed dog or jaw formed and arranged to penetrate the outer surface of the sole, mechanism to oscillate said dog whereby it is caused to enter the sole, and a support, as *w'*, to hold the work against the pressure of the dog when it is penetrating the sole, as set forth.

In testimony whereof we have signed our names to this specification, in the presence of two subscribing witnesses, this 6th day of August, A. D. 1887.

PETER A. COUPAL.
JOSEPH COUPAL.

Witnesses:
C. F. BROWN,
W. C. RAMSAY