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L. L. MILLER.

SEWING MACHINE.

No. 507,825. Patented Oct. 31, 1893.

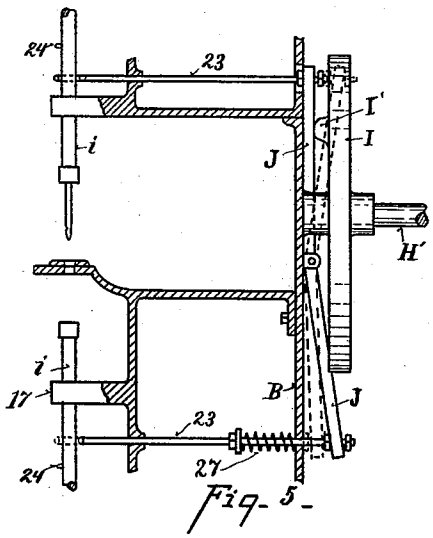

Fig. 5.

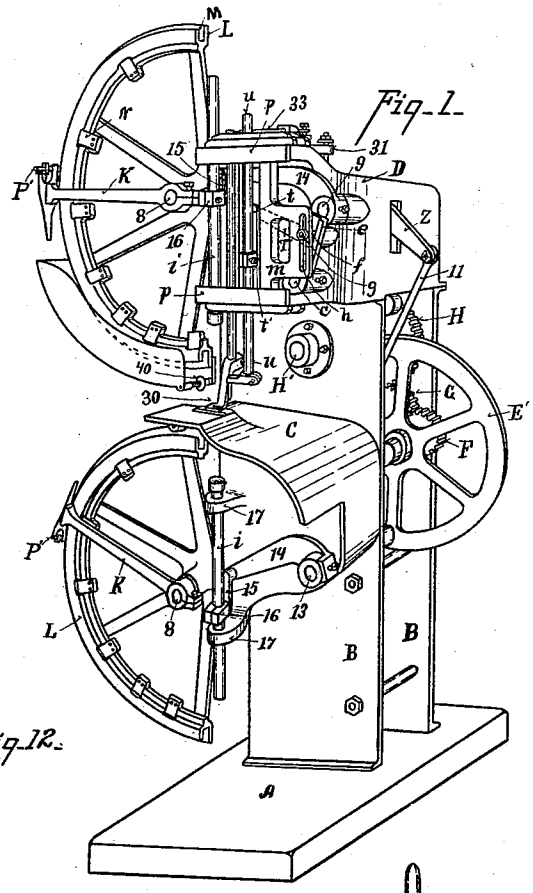

Fig. 1.

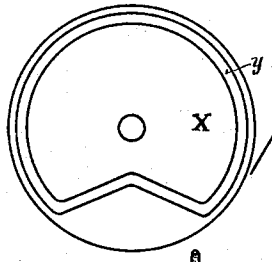

Fig. 12.

Fig. 2.

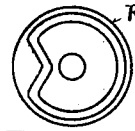

Fig. 20.

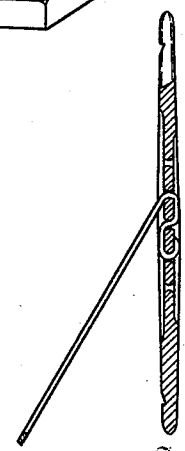

Fig. 14.

Witnesses
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Fig. 13.

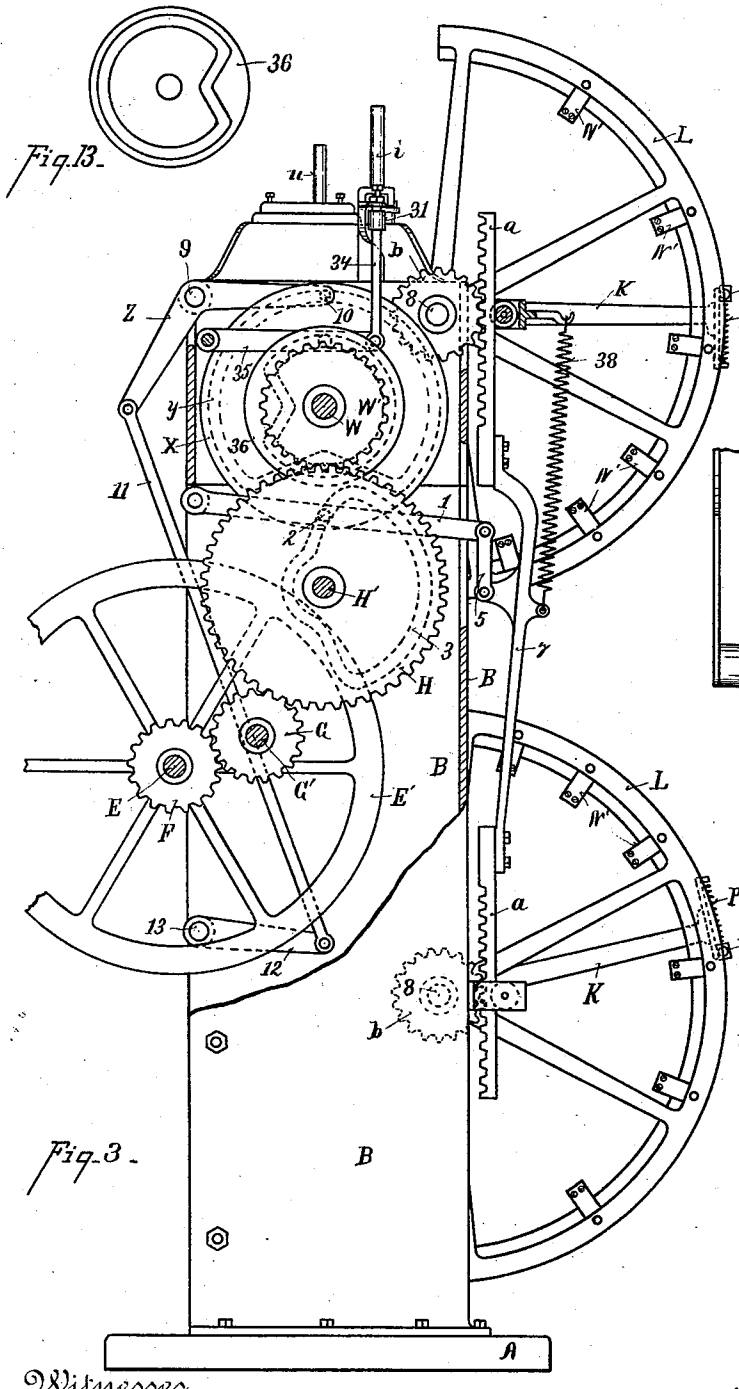

Fig. 3.

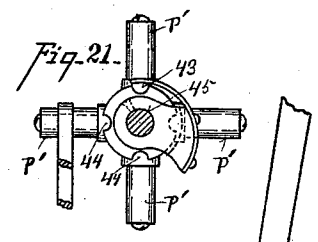

Fig. 21.

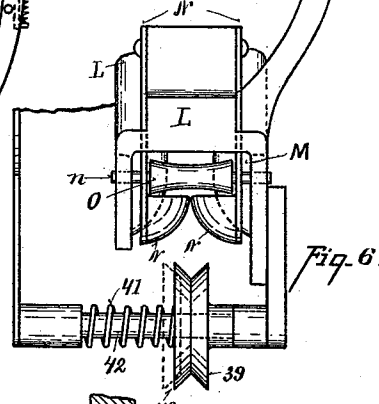

Fig. 6.

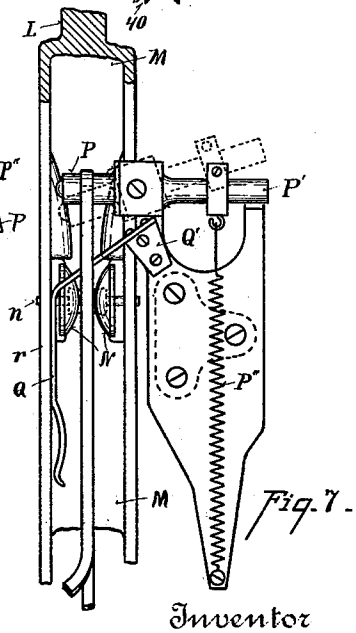

Fig. 7.

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Fig. 8.

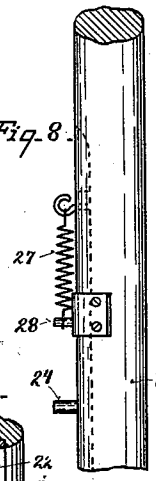


Fig. 9.

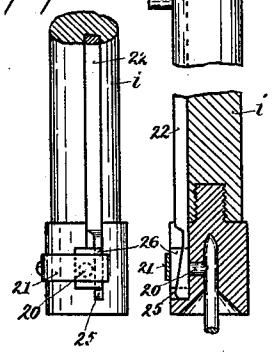


Fig. 10.

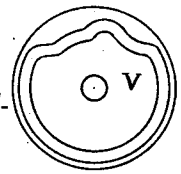
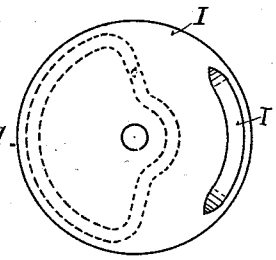


Fig. 11.



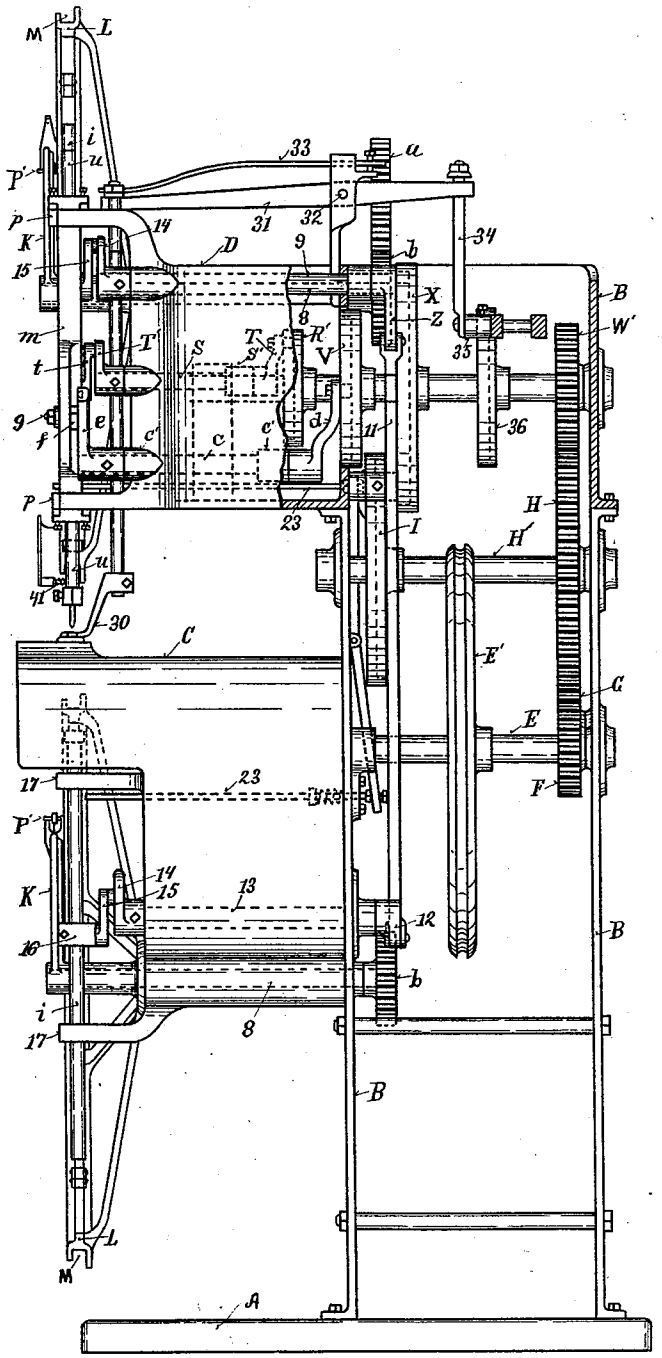


Fig. 4.

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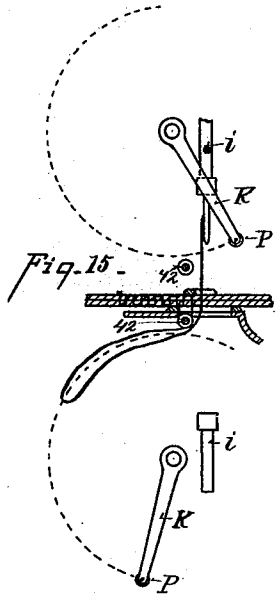

Fig. 15.

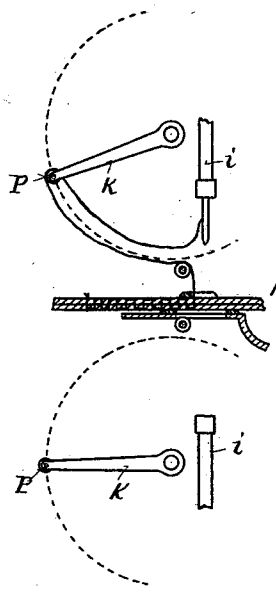

Fig. 16.

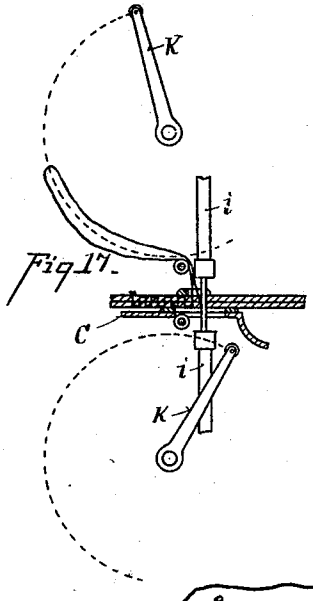

Fig. 17.

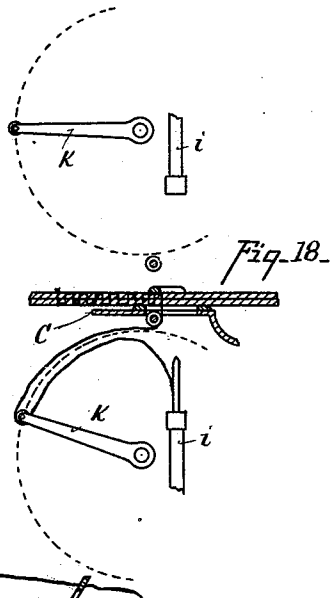

Fig. 18.

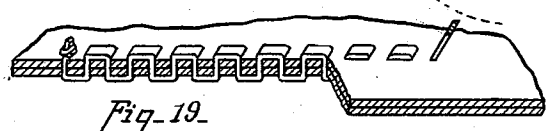

Fig. 19.

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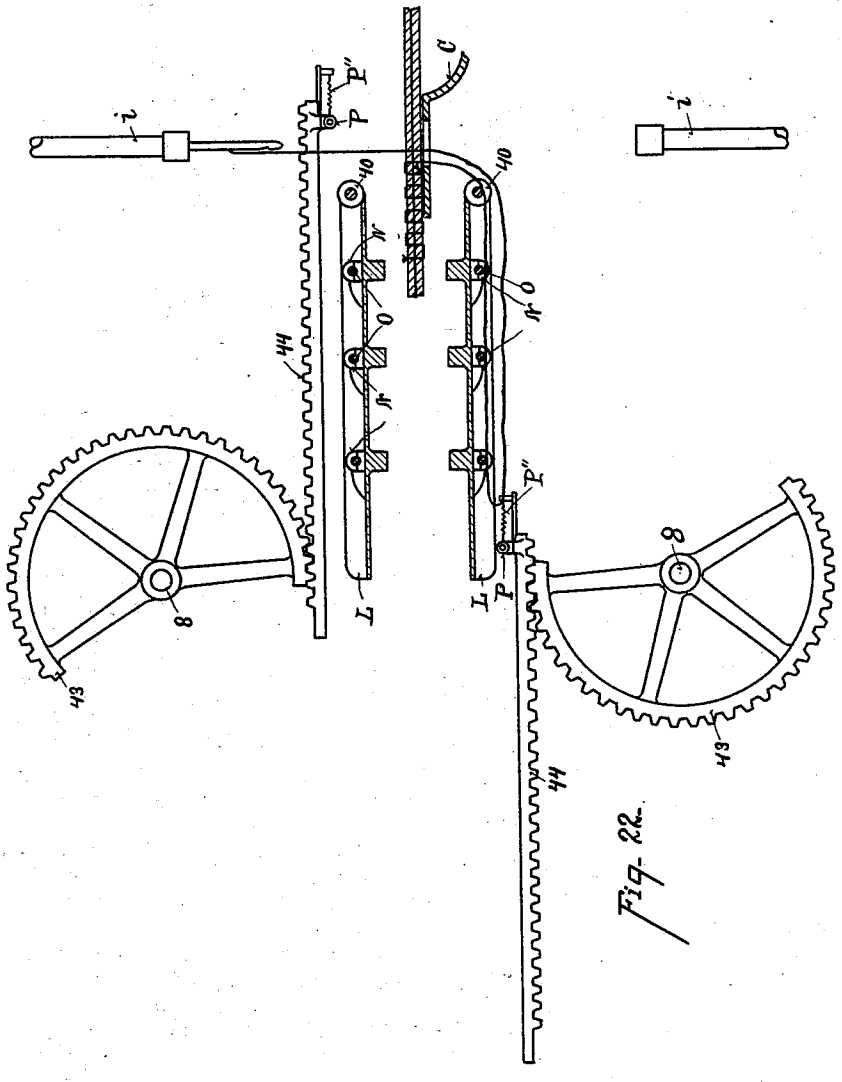

Fig. 22.

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UNITED STATES PATENT OFFICE.

LOUIS L. MILLER, OF NEWPORT, KENTUCKY, ASSIGNOR TO THE ROSS, MOYER MANUFACTURING COMPANY, OF CINCINNATI, OHIO.

SEWING-MACHINE.

SPECIFICATION forming part of Letters Patent No. 507,825, dated October 31, 1893.

Application filed March 27, 1893. Serial No. 467,839. (No model.)

To all whom it may concern:

Be it known that I, LOUIS L. MILLER, a citizen of the United States, residing at Newport, in the county of Campbell and State of Kentucky, have invented certain new and useful Improvements in Pop-Stitch Sewing-Machines, of which the following is a specification.

The primary object of my invention is to provide a machine which will sew horse-collars, belts, or other articles where a leather thong is employed, making what is known as a pop stitch.

Another object of my invention is to provide a take-up device which moves a full throw at each stroke and holds the string or thong under tension, and which is automatically tripped to release the thong by means of which it is drawn uniformly taut irrespective of the length of the thong.

Another object of my invention is to simplify the device so that the machine can be operated uniformly and with great speed.

Another object of my invention is to provide a driving mechanism preferably a cam which operates the needle bars upon both sides of the machine.

Another object of my invention is to provide a driving device preferably a cam which operates a take up device upon either side of the machine, thereby insuring a perfect uniform movement of the mechanism upon each side of the machine. This is important as very little variation in the length of movement of the different levers would prevent exact time movements.

The various features of my invention are fully set forth in the description of the accompanying drawings making a part of this specification, in which—

Figure 1 is a perspective view of the machine. Fig. 2 is a top plan view. Fig. 3 is an end elevation partly in section. Fig. 4 is a front elevation. Fig. 5 is a sectional elevation of the needle bar and tripping mechanism. Figs. 6 and 7 are detail views of the take-up devices. Figs. 8 and 9 are detail views of the needle bars and needle engaging device. Fig. 10 is a plan view of the cam operating the feed mechanism. Fig. 11 is the cam plate for operating the two take up devices, and tripping the needle. Fig. 12 is a plan view of the cam for operating the needle bars. Fig. 13 is a plan view of the cam for operating the foot. Fig. 14 is a sectional elevation of the threaded needle. Fig. 15 is a diagram representing the threaded needle with the thong above the table in the elevated position for presenting the thong to the upper take up device. Fig. 16 is a similar diagram representing the upper take up disposing of the thong. Fig. 17 is a diagram representing the position of the needle bars in the act of shifting the needle from the upper to the lower bar. Fig. 18 is a diagram representing the reverse position of the parts shown in Fig. 16. Fig. 19 is a sectional diagram illustrating the stitch. Fig. 20 is a plan of awl operating cam. Fig. 21 is a modification of the tripping takeup device in Fig. 7. Fig. 22 is a modification of the traveling take up arm.

A represents the base of the machine; B B a hollow column upon which the operating mechanism is mounted.

C represents the table on which the work is laid for operation.

D represents the top frame piece which projects forward and hangs over the table as shown in Fig. 4.

E represents the main driving shaft; E′ the driving pulley mounted thereon, which drives the several different sets of mechanism employed in the machine.

The working devices consist, first, of the needle bars *i*, *i*, operated in unison on opposite sides of the table, each one alternately receiving the needle from the other, and on the next stroke re-delivering it to the other in time movements; second, two take-up arms K, K, are likewise employed; the upper take-up arm takes the slack of the thong from the upward needle movement; the lower arm in like manner takes up the slack from the downward needle movement; third, awl bar *u* carrying an awl which punches the hole in advance of each needle thrust and feeds the goods forward in position to receive the needle between the time movements of the needle bar; and fourth a foot 30 mounted on a bar which moves down in advance of each needle movement and rises after the needle and thong

have been drawn through the goods. These several parts are operated in appropriate time movements by the following mechanism: E represents the main driving shaft; E′ the driving pulley; F a spur gear on the driving shaft E; G a transmitting gear meshing with gear H on shaft H′, upon which is mounted cam I, which operates the takeup mechanism. W′ represents a spur gear receiving motion from gear H upon the shaft of which is mounted cam 36 which operates the foot lift, and also cam X which operates the needle bar mechanism. Upon the same shaft is likewise mounted the cam R′ that operates the awl driving mechanism. A cam V operates the feed moving mechanism. Hence, by means of the cams I, 36, X, V and R′ the several mechanisms of the machine are appropriately operated in time movements; the takeup shaft and cam only make one revolution to two of the shaft operating the cams 36, X, V and R′. X represents the cam for operating the needle bars; said cam is provided with the groove *y*. Z represents a bellcrank lever keyed upon rock shaft 9 which journals on the frame of the machine; the inner end of said bellcrank lever is provided with a friction rolier 10 which travels in the groove *y;* the forward end of said bellcrank lever is hinged to the connecting rod 11. Said rod is hinged to the crank arm 12 of the rock shaft 13 which journals on the frame of the machine. Shaft 9 operates the upper needle bar, and shaft 13 the lower needle bar by the ordinary crank connection 14, and link 15, and clutch block 16; the needle bars reciprocating in ears 17 of the main frame.

The needle catch and tripping mechanism are constructed as follows: 20 represents a keeper pin engaging with the notch of the needle; this keeper pin is held in contact with the needle normally by the spring 21 which is retracted by the point of the needle pressing against the point of the keeper pin for the engagement of the needle as it is passed from one needle bar to the other. The tripping mechanism acts independent of this to release the needle at the appropriate time.

The tripping mechanism for disengaging the needle is constructed as follows: 22 represents a slide reciprocating in a groove cut in the needle bar. It is operated at each alternate movement of the needle bar for raising the keeper 20 and disengaging the needle. 23 represents the needle rod which moves forward at each alternate stroke of the needle into the position shown (see top rod) in Fig. 5. Its end projects under the tripping lug 24 which projecting from slide 22, as the needle bar descends it engages with the end of rod 23 and the said lug 24 is fixed to the slide 22, which lifts the slide; the forward end of said slide is provided with an incline 25 which fits a corresponding incline 26 of the keeper pin block, thus moving the keeper block and pin up releasing the needle which is retracted by its engagement with the opposite needle bar *i*. 27 represents a retractile spring engaging with the pin 28 for retracting the slide 22; the spring 21 pressing the keeper pin 20 back into position for holding the needle. It is necessary to operate the tripping rods 23 to retract the slides and release the needle at each alternate stroke of the needle bar, so that one rod moves forward while the opposite rod is moved backward, as shown in Fig. 5. The reciprocation of these rods in proper time movements to release the needle is accomplished by the following mechanism: I′ represents a lug on the face of cam I which oscillates the lever J; the outer end of said lever carries the reciprocating tripping rods 23. 27 represents a retractile spring coacting with the lug I′ to cause a positive reciprocation of said lever. The mechanism upon each side of the table are counterparts, both needle bars being operated by the cam X, the crank arms 12 and Z, being set opposite each other so that they operate to move the needle bars *i*, *i*, to and fro in unison. The takeup arms K are operated by cam I, racks *a*, *a*, and pinions *b*, *b*, are adjusted so that one is moved away from the needle while the other is approaching it, one taking up slack of the thong, and the other returning to position for taking it to draw the next stitch.

The takeup mechanism is operated by cam I as follows: 1 represents a cam lever provided with friction roller 2 which travels in the slot 3 of cam I; one end of which is journaled to the stud 4 on the frame. The forward end of said lever is provided with the link 5 hinged at one end to the cam lever, and the opposite end to the shank 6 of the reciprocating bar 7; said bar at each end is provided with a rack *a* engaging respectively with pinions *b;* these pinions are each mounted upon a shaft 8; upon the opposite end of each of said shafts is mounted a traveling carrier shown as an arm K. L represents segmental grooved thong guides, one above and the other below the table. In the groove M is mounted a series of guards N; these guards are each mounted upon a spring arm N′. O represents a series of friction rollers journaled upon axles *n* spanning the groove of the guides L. In Fig. 6 I have shown an end view of said guide L opposite the needle, the guards N being outside of the friction roller. The faces of these guards are inclined so that the thong itself opens them as it passes between them on to the rollers. A series of these is provided as shown in Fig. 3 at different places around the segment. The friction rollers O support the thong as it is drawn around the segment. The spring guards prevent the thong from flying out until it is drawn out by the strain of the opposite takeup arm.

Upon the carrier K is mounted the thong takeup which is constructed as follows: P represents a roller mounted upon the shaft P′. P″ represents a spring for holding it normally in position as shown in Fig. 7; this

spring controls the tension of the thong. Q represents a drag spring which is attached to the lug Q'; the arm of the spring rests against one of the flanges of the grooved guide L; the opposite end of this spring arm is inclined so that when the thong is pulled off of the takeup roller P it strikes this drag spring and is pulled out between the spring and flange *r* which prevents the whipping of the thong and causes it to be delivered regularly to the takeup arm on the opposite side of the needle.

I prefer to employ an awl to punch the holes through the goods, and while in this position to feed the material forward to be in line with the path of the needle, so that the needle is readily passed through the hole punched as soon as the awl has been retracted. For this purpose I provide the following mechanism: R' represents the cam for reciprocating the awl up and down in appropriate time movements ahead of each needle thrust; motion is transmitted from cam R' to the awl bar U by means of the cam lever T keyed to the rock shaft S, which journals in the bearings S', as shown in Fig. 2. *t* represents a link hinged to the crank T' on the outer end of the shaft S. *t'* represents a clutch block connecting the link *t* to the awl bar U. The cam R' is adjusted relatively to the cam X so that the awl reciprocates between the reciprocating movements of the needle bar.

In order to operate or move the needle bar U forward to effect the feeding of the material I provide the following mechanism: *m* represents the carrier head in which the awl bar U is mounted; said head moves in slides *p* as shown in Fig. 1; it is operated by means of the cam V, and cam lever *d* keyed to the rock shaft *c*. *e* represents a crank arm keyed to the outer end of the rock shaft *c*, carrying a stud 9 which engages in the slot of the head *m*, and the parts are so adjusted that the head is reciprocated forward while the awl is in the goods, and moves back as soon as the awl is raised, making what is known as a positive awl feed. The awl bar, therefore, has two motions, the up and down motion operated by cam R', and the feed motion operated by the cam V and the slide head *m*.

The foot must be operated in time movement with the awl feed while the needle bars and takeup arms are idle; the foot 30 is raised just in advance of the forward movement of the head *m*. The time movement of the foot 30 is secured by the following devices: 31 represents a tilt bar (Fig. 4) journaled upon the pin 32, on the forward end of which the foot bar is suspended; 33 represents a spring for holding the foot bar normally down; 34 represents a link connecting the tilting bar 31 with the crank arm 35; said crank arm is provided with a friction roller moved in a slot on cam 36; the groove of the cam is of such form as to lift the foot bar just in advance of the forward feed movement of the awl. 38 represents a retractile spring for taking up the lost motion and cushioning the movements of the racks, thereby preventing shocks being transferred to the carrier arm K at the end of the feed stroke of the takeup mechanism.

In order to prevent the thong from being twisted while the slack is being taken up, and at the same time prevent the thong from whipping back on the needle when it is released by the tension, I provide the following devices: 39 represents a friction roller. 40 represents an opposing friction roller loosely journaled on shaft 42. 41 represents a retractile spring coiled around said shaft and normally holding the frictional roller in place; the two frictional rolls 39, 40 act as a split friction roller, and as the thong is drawn over the peripheries of said rollers it moves the roller 40 away from the roller 39 far enough to allow it to pass between their faces, and the rollers hold the stitch end of the inside loop of the thong away from the needle while the thong is being fed backward for the next stitch; and it is drawn out of engagement between said rollers by the strain of the takeup device; there being duplicate parts on each side of the table opposite the needle bars, the details of one of the parts being illustrated in Figs. 6 and 7.

Mode of operation: In the diagrams Fig. 15 represents a piece of goods in the act of being sewed with the thong drawn upward in position for the engagement of the thong take up or roller P with the thong to take up the slack. Fig. 16 represents one of the carriers K with the thong looped over it in the act of taking up the slack; the carrier on the opposite side of the machine is shown in the proper relative position in these two figures. Fig. 17 represents the thong as having been pulled off of the roller P mounted on the tilting shaft P'. The carrier K has moved its full stroke, but the thong has been released by the strain of the thong on the tilting shaft P' overcoming the resistance of the tension spring P'', see Fig. 7. The needle bars are shown in position for passing the needle from one to the other through the goods for drawing the thong downward to take the next stitch. Fig. 18 represents the reverse position of the parts above and below the table of the machine shown in Fig. 16.

A very important feature of my invention is a thong carrier mounted upon a traveling device, said thong carrier being governed by the tension device which normally holds it in position for carrying the thong, but yields to the strain on the thong, trips and releases the thong when the stitch is drawn taut. This may be accomplished in very many ways. In the preferred form I have shown a tilting shaft P' which is held in place by the tension spring. Other means of providing the tension trip may be employed. In Fig. 21 I have shown one modification of such tension. It consists of four rotating arms *p'* mounted upon an axis 45 projecting from carrier K.

43 represents a spring pawl engaging consecutively in notches 44 in the hub or boss from which the arms p' project. I prefer the spring tension to the friction tension as it is more sensitive and better regulated, but I do not wish to limit myself to any particular device unless specified as elements of claims herein, as very many mechanical equivalents can be substituted in lieu of those herein shown. I have shown a carrier K upon which the automatic tripping tension device is mounted.

I do not wish to limit myself to a traveling arm, as any traveling tension carrier of different form of construction would accomplish the same result whether traveling in curved or in right lines; the principle being to take up the slack of the thong and release it by the strain of the thong in drawing the stitch taut.

In Fig. 22 I have illustrated one of the methods which consists in substituting for the arms K a segmental gear 43 mounted on the shaft 8, the teeth of which gear engage with the traveling racks 44 upon which are mounted the tripping thong carriers P which operate in substantially the same manner as the oscillating arms, but travel in right lines instead of in curved lines.

Having described my invention, what I claim is—

1. In a pop-stitch sewing machine, the needle bars i, i, and mechanism for operating the same in unison with each side of the work, in combination with driving mechanism operating take-up devices, each consisting of an arm K on which is mounted a tripping thong-carrier provided with a spring which holds the same in normal position for taking up the slack and tripping under the strain of the thong to release the same when the stitch is drawn, said take-up devices working alternately between each unison movement of the needle bars, substantially as specified.

2. In a pop-stitch sewing machine, the needle bars i, i, and driving mechanism for operating them in unison on each side of the work, in combination with take-up devices and driving mechanism for operating the same alternately with the unison movements of the needle bars, and an awl punching and feeding device provided with driving mechanism for operating the same between each movement of said needle bars, substantially as specified.

3. In a pop-stitch sewing machine, the needle bars i, i operating in unison on either side of the work, in combination with take-up devices K and driving mechanism operating the same alternately between each movement of the needle bars and an awl punching and feeding device provided with driving mechanism arranged in time movements with the take-up and needle bar mechanism, whereby the hole is punched, the goods fed, and the needle passed through the goods alternately from one needle bar to the other, substantially as specified.

4. In a pop-stitch sewing machine, in combination with the needle bars i, i, and mechanism for operating the same in unison on each side of the table, the carriers K operated by driving mechanism in time movements so that each carrier engages with the thong slack as its associate needle bar draws the needle and thong through the goods, and the awl punch, provided with driving and feeding mechanism adapted to operate the same in time movements between each full movement of the needle bars, substantially as described.

5. In a pop-stitch sewing machine, the combination with needle bars i, i, take-up arms K and awl bar U, of driving mechanism consisting of the shaft H and cam I, and lever driving mechanism operating the take-up arms located upon the shaft H, driven at a given speed, and the cams X, V, R, for operating the needle bar, awl, and feeding mechanism mounted upon a separate shaft and driven two revolutions to one of shaft H, whereby the said operating parts perform their respective offices each in time movements with the other, substantially as described.

6. In a pop-stitch sewing machine, the combination of a traveling thong carrier, a tension take-up thereon, mechanism for tripping the take-up and releasing the thong by the strain on the loop, and mechanism for automatically resetting the thong carrier, substantially as described.

7. In a pop-stitch sewing machine, the needle-bars i, i and driving mechanism for operating them in unison on each side of the work, the take-up devices and driving mechanism for operating the same between the unison movements of the needle-bars, and catch and releasing mechanism applied to each of said needle bars, and adapted to grasp and release the thong needle, in combination with the awl punching and feeding device with driving mechanism for operating the same between each movement of said needle bar, substantially as specified.

8. In a pop-stitch sewing machine, in combination with the needle bars i, i, the needle catch and releasing mechanism, and a traveling tension carrier, a thong take-up mounted thereon, and a tension device holding said take-up normally in position for taking up the slack and yielding to the strain of the thong to release the same when the stitch is drawn, substantially as specified.

9. In a pop-stitch sewing machine, the combination with the needle bars i, i, of catch and releasing mechanism operating in time movements to alternately deliver a thong-needle from one bar to the other at each movement thereof, the traveling carrier K, a tripping take-up and an adjustable tension spring for regulating the tripping by the strain of said thong in drawing the stitch, without effecting the movement of the carrier K, substantially as specified.

10. In a pop-stitch sewing machine, the needle bars *i*, *i*, and catch and delivering mechanism adapted to pass the needle alternately through the goods, in combination with the traveling carrier K, a tripping thong take-up, a tension device, and the drag spring Q, interposed in the loop of the thong for retarding the return of the loop under the strain of the needle, substantially as specified.

11. In a pop-stitch sewing machine, the needle bars *i*, *i*, and catch and delivering mechanism adapted to pass the needle alternately from one bar to the other, through the goods, in combination with the traveling carrier K, the automatic tripping thong take-up, segmental grooved guide L and a series of friction rollers O journaled in the groove of said guide L, substantially as specified.

12. In a pop-stitch sewing machine, the needle bars *i*, *i*, and catch and delivering mechanism adapted to force the needle from one to the other, through the goods, in combination with the traveling carrier K, the grooved guide L, a series of friction rollers O journaled in said groove, and the series of spring guards N, N, mounted in front of said friction rollers O, substantially as specified.

13. In a pop-stitch sewing machine, the needle bars *i*, *i*, and catch and delivering mechanism adapted to pass the needle alternately from one bar to the other, through the goods, in combination with the traveling carrier K, the automatic tripping thong take-up mounted thereon, and the split friction rollers 39, 40 adapted to receive, guide and hold the thong loop, substantially as specified.

14. In a pop-stitch sewing machine, the needle bars *i*, *i*, and catch and delivering mechanism adapted to pass the needle alternately through the goods, in combination with the traveling carriers K, K, upon opposite sides of the work, the cam I, cam lever 1, link 5, reciprocating bar 7 provided with rack *a* at each end, and gears *b* mounted on the take-up shaft 8 whereby said carriers K are reciprocated in unison with the needle bars *i*, *i*, and moved alternately in opposite directions to and from the needle bars, substantially as specified.

15. In a pop-stitch sewing machine, in combination with the main frame R, the overhanging head D, the needle bars *i*, *i*, with their needle catch and releasing device, driving mechanism for operating the same in unison on opposite sides of the work, the awl bar U, an awl and driving mechanism for operating it to pierce the goods between each movement of the needle bars, whereby a hole is pierced through the goods while the needle bars are idle and the goods fed forward for the operation of the thong needle, substantially as specified.

In testimony whereof I have hereunto set my hand.

LOUIS L. MILLER.

Witnesses:
T. SIMMONS,
C. W. MILES.