

M. KOEHLER.
LOOPING MACHINE.

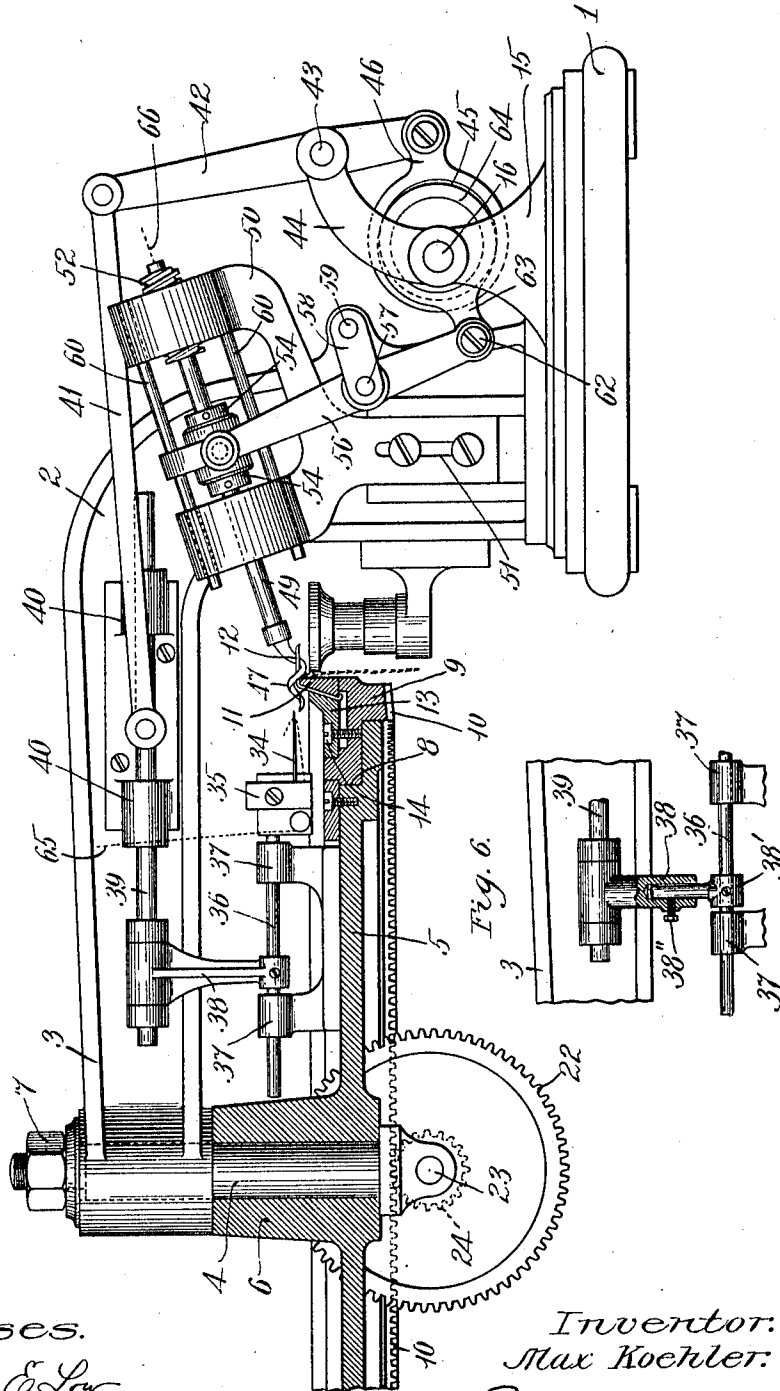
APPLICATION FILED JUNE 17, 1909.

Patented May 21, 1912.

3 SHEETS-SHEET 1.

1,026,808.

Fig. 1.



Witnesses.

Franklin E. Low.

Robert H. Hammler.

Inventor:
Max Koehler.

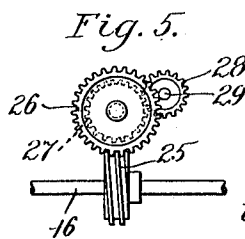
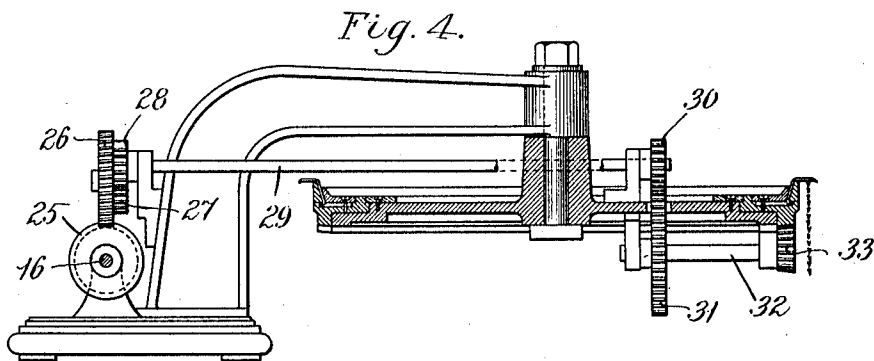
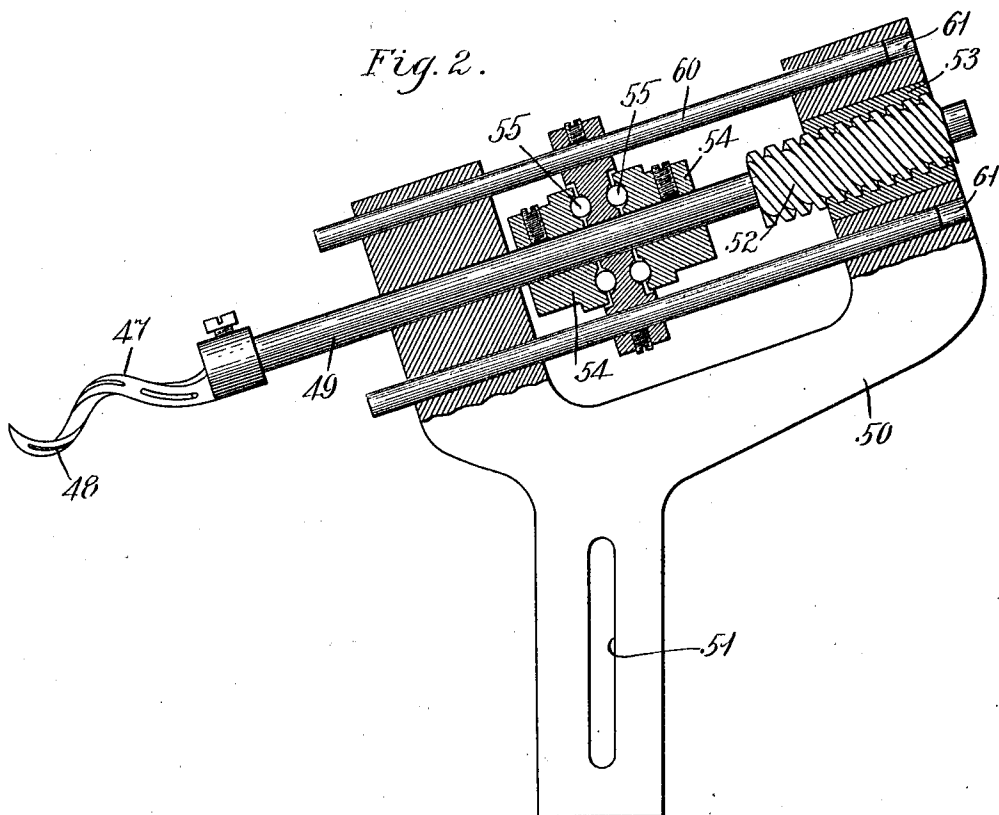
by Emory and Booth.
Attys

1,026,808.

M. KOEHLER.
LOOPING MACHINE.
APPLICATION FILED JUNE 17, 1909.

Patented May 21, 1912.

3 SHEETS-SHEET 2.



Witnesses.

Franklin E. Low.
Robert H. Kammler.

Inventor.
Max Koehler.

by Emery and Booth.
Attys

M. KOEHLER.
LOOPING MACHINE.

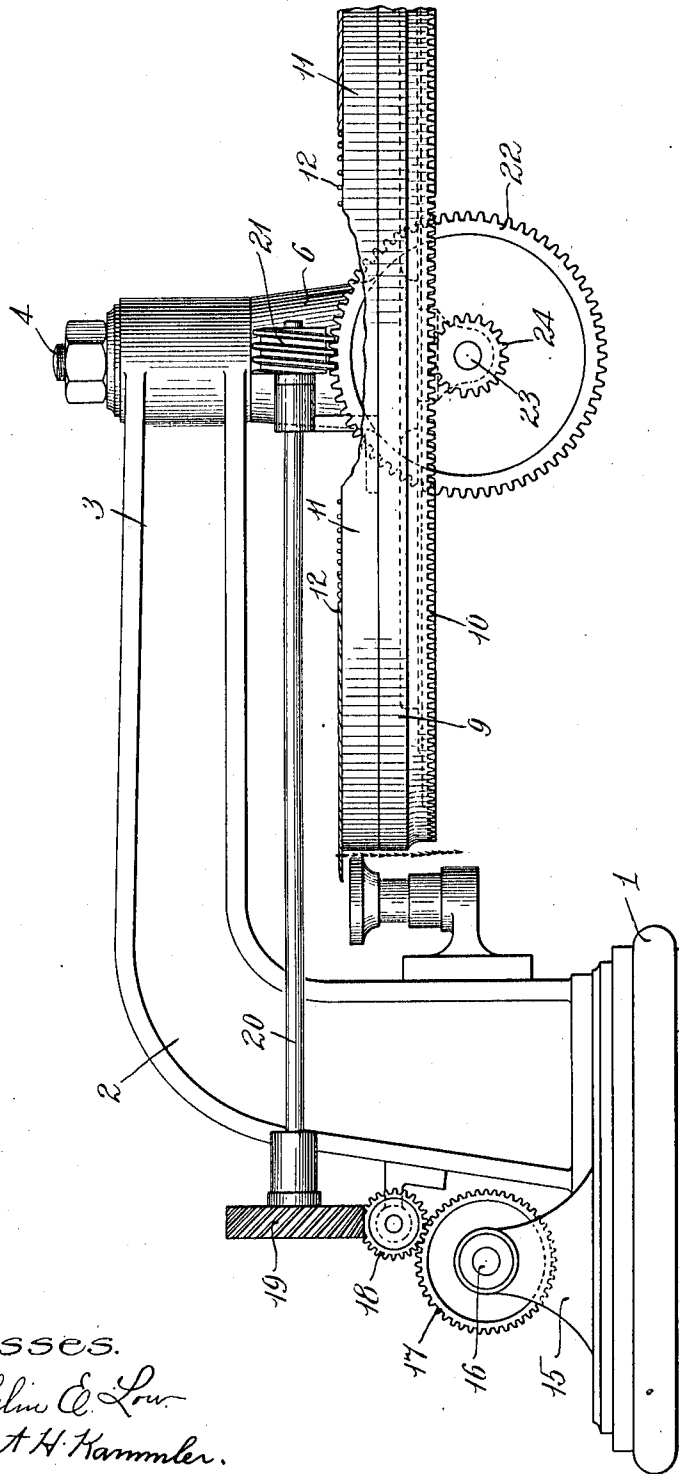
APPLICATION FILED JUNE 17, 1909.

Patented May 21, 1912.

3 SHEETS-SHEET 3.

1,026,808.

Fig. 3.



Witnesses.
Franklin E. Low.
Robert H. Hammler.

Inventor:
Max Koehler.
by *Emory Borch.*
Attys

UNITED STATES PATENT OFFICE.

MAX KOEHLER, OF LIMBACH, GERMANY, ASSIGNOR TO THE FIRM OF JULIUS KOEHLER, OF LIMBACH, GERMANY.

LOOPING-MACHINE.

1,026,808.

Specification of Letters Patent.

Patented May 21, 1912.

Application filed June 17, 1909. Serial No. 502,741.

To all whom it may concern:

Be it known that I, MAX KOEHLER, a subject of the Emperor of Germany, and a resident of Limbach, in the Kingdom of Saxony and Empire of Germany, have invented an Improvement in Looping-Machines, of which the following description, in connection with the accompanying drawings, is a specification, like letters on the drawings representing like parts.

This invention relates to looping machines and more particularly to circular looping machines having means to join together two separate knit pieces of textile material in plain or rib stitch by means of a seam, stitching the knit pieces loop by loop. My invention may also be used to finish off the self-raveling edge of a single fabric.

In order that the principles of my invention may be readily understood, I have disclosed a single type or embodiment thereof in the accompanying drawings, wherein—

Figure 1 is a view partly in side elevation and partly in vertical section of a circular looping machine, embodying my invention; Fig. 2 is an enlarged view mainly in longitudinal vertical section, of the spiral hook and a portion of the operating means therefor; Fig. 3 is a view mainly in side elevation of one form of mechanism for rotating the dial; Fig. 4 is a view partly in side elevation and partly in vertical section of another form of means for rotating the dial; Fig. 5 represents a portion of the mechanism shown in Fig. 4; and Fig. 6 is a detail to be hereinafter referred to.

The mechanism herein disclosed is more particularly intended for use in stitching together loop-by-loop two knitted pieces of textile material such, for example, as the ribbed cuff to a sleeve, arm or leg of under garments, or it may be used for seaming full fashioned goods or for closing the heels and toes of full fashioned hosiery or for closing the toes in seamless hosiery.

Referring more particularly to the drawing, the base of the machine is represented at 1. Rising therefrom is a standard 2 having a horizontal portion 3 provided with an opening for the passage of a stud 4 preferably secured to the head 5 of the dial, the said stud passing through the sleeve like central portion 6 of the head and being secured in position in the standard by the nut 7. The head 5 is provided with an

annular shoulder 8 receiving thereon the dial 9 having an annular gear 10 upon its lower edge. The dial is preferably provided with a brass ring 11 grooved or otherwise formed on its inner face to receive points 12 held in position by the ring 13 and screws 14.

Mounted in a short standard 15 (see Fig. 3) is the main driving shaft 16 to which power is applied in any suitable manner. Fast upon said shaft is a gear 17 meshing with which is a pinion 18 suitably mounted upon the standard 2 and meshing in turn with the preferably skew gear 19 fast upon the countershaft 20 mounted in suitable brackets upon the standard 2. At its opposite end the said countershaft 20 is provided with a worm 21 meshing with and driving a worm wheel 22 fast upon a countershaft 23 mounted in brackets upon the under side of the head 5 and provided at its outer end with a pinion 24 meshing with the annular gear 10 of the dial. By employing a worm to rotate the dial, I prevent all possibility of over movement of the dial, whether the latter be driven at a high or low speed.

It is of course apparent that any suitable type of worm gearing may be employed and that it may be located where desired. For example, in Fig. 4 I have represented the main driving shaft 16 as provided with a worm 25 meshing with and driving a worm wheel 26 having coaxial therewith a gear 27 meshing with and driving a pinion 28 upon a countershaft 29 mounted in suitable bearings in the standard and head and having at its opposite end a pinion 30 meshing with and driving a gear 31 upon a countershaft 32 mounted in bearings upon the underside of the head. The said countershaft 32 has a pinion 33 meshing with the annular gear 10 of the dial to rotate the same in the manner already described.

The fabric or fabrics to be seamed or joined are placed loop-by-loop upon the points 12 in the usual manner. In order to seam or join the fabric or fabrics I provide a reciprocatory needle mounted within the circle of the points 12 and a screw hook mounted outside said circle. Referring more particularly to Fig. 1 the needle is represented at 34 it having an eye near its outer end and being mounted in a head 35 having a spindle like portion 36 mounted for sliding movement in brackets 37 rising

from the head 5. Secured to the spindle 36 is an arm 38 fast upon a slide rod 39 mounted for sliding movement in brackets 40 upon the standard 2. Any suitable means may be employed to reciprocate the slide bar 39. Herein for the purpose I have shown a link 41, pivoted to slide bar 39 and to a lever 42 pivoted at 43 upon a bracket 44. Upon the main driving shaft 16 is mounted a cam or eccentric 45 through which a to and fro motion is imparted to the lever 42 by means of the eccentric ring 46 pivoted to the lower end of said lever 42.

The spiral or screw hook heretofore referred to is represented at 47 in Figs. 1 and 2, it being provided with a slotted eye 48 of any suitable extent. The said spiral hook is formed or mounted upon a spindle 49 which is received in suitable openings in a bracket 50 secured to the standard 2 in any suitable manner and preferably with capacity for vertical adjustment as shown at 51. The spindle 49 is downwardly inclined toward the points 12 for a reason to be more fully described hereinafter, and is provided at a suitable point with a worm or screw 52 corresponding in pitch with the hook 47, and received within a nut 53 (see Fig. 2) mounted in the bracket 50.

I have provided simple but effective means for reciprocating the spindle 49 thereby to rotate upon its axis the said spindle and the hook 47. Herein for the purpose, I have provided the spindle 49 with washers 54 (see Fig. 2) formed to receive ball bearings 55 interposed between said washers and a lever 56 pivoted at 57 to a link 58 which in turn is pivoted at 59 upon the standard of the machine. Preferably I provide the upper end of the lever 56 with opposite rods 60 shown in Fig. 2 as received for sliding movement in suitable holes 61 bored in the bracket 50 thereby steadying the motion of the lever. The lower end of the lever 56 is pivoted at 62 to an eccentric ring 63 to which suitable movement is imparted by the cam or eccentric 64 upon the main driving shaft 16.

The machine herein represented is intended to be driven at a high rate of speed, such, for example, as 800 or 1000 reciprocations of the needle and of the spiral hook per minute; it is partly due to the ball bearings already described that I am enabled to secure this rate of speed. Moreover it is apparent that the construction of parts is simple and the necessary parts are few in number thereby permitting a high speed.

By the mechanism herein disclosed I seam or join together the fabric or fabrics by a two thread overstitch. One of the threads is fed to the needle as represented at 65 in Fig. 1 and the other thread is delivered to the spiral hook as represented at 66 in said figure. The thread 66 is delivered axially

through the spindle 49 which is made hollow for that purpose, thereby preventing the twisting of the thread or yarn.

In the operation of the mechanism the needle is advanced through the fabric carrying its thread and as it begins its return movement the needle thread is looped slightly upward at the front edge of the fabric. Thereupon the spiral hook is advanced and passes through the loop of the needle thread which throughout the operation is maintained at the outer edge of the fabric. The needle continues to retract leaving its loop upon the spiral hook and the latter is advanced until its point or free end is beneath the plane of the needle. The needle now advances until it meets the spiral hook but passes above the same and below the looper thread, in other words the needle passes between the spiral hook and the thread thereof, and enters the fabric. Thereupon the hook is retracted and wraps its thread around the needle thread, the needle thread being still upon the hook. The retracting movement of the hook continues, the hook thereby drawing the thread through the loop of the needle thread which then slips off the hook and one cycle in the seaming or joining operation is completed.

The location of the needle upon the inside of the circle of points and the location of the spiral hook or looper upon the outside of such points as specified hereinafter in the claims constitutes a very important feature of my invention. It is apparent that by locating the needle within the circle of points and by advancing the spiral hook so that it acts inside said circle of points, it is impossible for the thread of the looper or spiral hook to catch upon the said points, as has heretofore been the case in constructions wherein a hook or looper has been mounted within the circle of points to operate upon or pass to the outside of such points. When the spiral hook or looper is mounted within the circle of points and advances outside of said circle in the seaming operation and then begins its inward or retracting movement, sufficient slack is usually formed in the looper thread to permit such thread to catch upon the points and break. By locating the spiral hook outside the circle of points, I entirely overcome this objection.

It has heretofore been found necessary particularly in those types of looping machines wherein a hook or looper is situated within the circle of points, to apply a very considerable tension to the looper or hook thread to prevent the formation of undue slack. By arranging the parts in the manner indicated I am enabled to operate the mechanism with but little tension upon the thread and so can use an open twist single yarn such, for example as single 18 to 20.

In this manner I can provide a much softer seam than has heretofore been possible in looping machines with which I am acquainted. Furthermore because of the slight tension that I impart to the thread or yarn, the appearance of the stitch is always the same, whether the machine be driven at high or low speed. In looping machines with which I am acquainted and wherein it has been necessary to use a high tension upon the thread, the existence of a lump upon the thread results in the production of a series of loops formed at high tension when the lump or knot resists passage through the tension device and then the formation of a series of loops at low tension immediately after the passage of the lump through the tension. The tension device preferably employed by me is such as to produce a slight tension upon the thread or yarn and may be such as to permit the use of an open twist single yarn.

It will be observed that the spindle of the spiral hook is inclined downwardly toward the points 12, thereby permitting the needle readily to pass between the point of the hook and the yarn or thread of the hook. Moreover the hook passes through the loop of the needle thread at the outside of the fabric without displacing the loop, the hook merely sliding through the loop. This results in less strain upon the needle thread and more accuracy in the formation of the stitch as well as greater uniformity of the stitch. Moreover the loop of the needle thread cannot be displaced, because any strain thereon due to the action of the spiral hook is inward against the circular points. Preferably the arm 38 is suitably divided so that it may be separated from the needle 36 without removing the latter from the brackets 37. In this manner, the dial with its several parts and the needle may be separately packed for shipment or other purposes. For this purpose, I have in Fig. 6 represented the arm 38 as having a head 38' removably secured thereto by set screw 38'' or otherwise. The head 38' is bored for the reception of the spindle 36.

It will be observed that the dial may be rotated by the worm gearing in either direction.

Having thus described one illustrative embodiment of my invention, I desire it to be understood that although specific terms are employed they are used in a generic and descriptive sense and not for purposes of limitation, the scope of the invention being set forth in the following claims:

1. Looping mechanism comprising in combination a dial provided with a series of points, a head carrying said dial, a needle, means to impart to and fro motion thereto, a bifurcated bracket having in one member a cylindrical bearing and in the other mem-

ber a stationary nut, a spiral hook mounted in said bearing and having a worm engaging said nut, and means operatively engaging the hook between the bearing and worm to reciprocate the hook.

2. Looping mechanism comprising in combination a dial having a series of points, a head carrying said dial, a bifurcated bracket having in one member a cylindrical bearing and in the other member a nut, a spiral hook having a shank mounted in said bearing and having a worm engaging said nut, and a lever directly engaging said hooked shank between said bearing and nut to reciprocate the hook.

3. Looping mechanism comprising in combination a dial having a series of points, a head carrying said dial, means to rotate the dial, a needle mounted upon the head within the dial, means to reciprocate the needle, a bifurcated bracket mounted outside said dial and having in one member a cylindrical bearing and in the other member a nut, a spiral hook mounted in said bearing and having a worm engaging said nut, a lever directly engaging said shank to reciprocate said hook, and means to operate said lever.

4. Looping mechanism for uniting looped fabrics by two interengaging threads comprising in combination a dial provided with a series of points, a head carrying said dial, means to rotate said dial, a needle mounted upon the head and to which needle a looping thread is fed, means to reciprocate said needle, a bifurcated bracket mounted outside said dial and having in its members a cylindrical bearing and a nut, a spiral hook having a shank mounted in said bearing and having a worm engaging said nut and to which hook a second looping thread is fed for interengaging with the first looping thread, a lever to reciprocate said hook, and means to operate said lever.

5. Looping mechanism for uniting looped fabrics by two interengaging threads comprising in combination a dial provided with a circular series of points, a head carrying said dial, worm gearing for rotating said dial, a needle mounted upon the head and to which needle a looping thread is fed, means to impart a to and fro motion to said needle, a spiral hook mounted outside said dial and to which hook a second looping thread is fed for interengaging with the first looping thread, means to project said hook within said points and to retract it therefrom, and means to rotate said hook.

6. Looping mechanism comprising in combination a dial or head having a series of points, a spiral hook positioned at one side of said points and downwardly inclined toward said points and having means to project it toward or from said points.

7. Looping mechanism comprising in combination a dial having a circular series of

70

75

80

85

90

95

100

105

110

115

120

125

130

points, means to rotate said dial, a spiral hook mounted exteriorly of and downwardly inclined toward said points and means to reciprocate said hook.

5 8. Looping mechanism comprising in combination a dial having a circular series of points, a spiral hook mounted outside thereof, a shank for said hook having a worm, a nut engaging said worm, washers fast upon
10 said shank, a lever for reciprocating said hook and received between said washers, and roller bearings between said lever and washers.

15 9. Looping mechanism comprising in combination a dial having a circular series of points, a head carrying said dial, a needle and a spiral hook both cooperating with said points, means to impart a to and fro motion to said needle, said hook having an
20 axially recessed shank, means to reciprocate and rotate said hook, and means to deliver yarn or thread to the hook within said recessed portion of the shank.

25 10. Looping mechanism comprising in combination a dial or head having a series of points, a needle and spiral hook mounted upon opposite sides thereof, a shank carrying said hook, an adjustable bracket wherein said hook is mounted for reciprocation, and
30 means to impart reciprocatory movement to said hook.

35 11. Looping mechanism comprising in combination a dial having a circular series of points, a needle mounted within said points, means to reciprocate said needle, a spiral hook mounted exteriorly of said points and downwardly directed toward said points, and means to reciprocate and to rotate said hook.

40 12. Looping mechanism comprising in combination a dial having a circular series of points, a straight needle mounted within said points, means to reciprocate said needle, a spiral hook mounted exteriorly of said points and downwardly directed toward said points, a worm carried by said hook, a nut engaging said worm, and a lever to reciprocate said hook.

50 13. Looping mechanism comprising in combination, a dial, a circular series of points carried thereby, a reciprocatory needle mounted within said dial, a rod 39 for reciprocating said needle and a two part socketed connection between said rod and
55 said needle, whereby the dial and its needle may be disassociated from the said rod.

60 14. Looping mechanism comprising in combination a dial provided with a series of points, a head carrying said dial, means to rotate said dial, a needle mounted within the dial, means to impart a to and fro motion to said needle, a bifurcated bracket mounted outside of said dial, a spiral hook having a shank mounted in the bifurcations
65 of said bracket, a lever operatively engaging

said shank and having rods 60 slidably mounted in said bracket, and means cooperating with said shank to rotate the hook.

70 15. Looping mechanism comprising in combination a dial having a circular series of points, a head carrying said dial, means to rotate said dial, a needle mounted within said dial, means to reciprocate said needle, a bracket mounted outside of said dial, a spiral hook having a shank mounted in said
75 bracket for reciprocation therein, and a lever 56 directly engaging said hooked shank to reciprocate the hook.

80 16. Looping mechanism comprising in combination a dial having a circular series of points, a head carrying said dial, a needle mounted within said points, means to reciprocate said needle, a spiral hook provided with a shank and mounted outside of said points and downwardly directed toward
85 said points, and an upright lever 56 engaging the hook shank to reciprocate the hook.

90 17. Looping mechanism comprising in combination a dial having circular series of points, a head carrying said dial, a needle mounted within said points, means to reciprocate the needle, a bifurcated bracket mounted outside of said points, a spiral hook having a shank mounted in the bifurcations of said bracket, said hook being downwardly
95 directed toward said point, and a lever 56 for reciprocating said hook.

100 18. Looping mechanism comprising in combination a dial having a circular series of points, a head carrying said dial, a needle mounted within said points, means to reciprocate the needle, a bifurcated bracket mounted outside of said points, a spiral hook having a shank mounted in the bifurcations of said bracket, said hook being
105 downwardly directed toward said points, and a lever 56 directly engaging the shank of the hook between the bifurcations of the bracket to reciprocate the hook.

110 19. Looping mechanism comprising in combination a dial having a circular series of points, a head carrying said dial, a needle and a spiral hook cooperating with said points, means to reciprocate the needle, said hook being downwardly directed toward
115 said points, and provided with a shank, and a lever directly engaging the shank of the hook to reciprocate the latter.

120 20. Looping mechanism for uniting looped fabrics by two interengaging threads comprising in combination a dial provided with a circular series of points, a head carrying said dial, means to rotate the dial, a needle mounted within the dial and to which a loop thread is fed, an inclined spiral hook
125 mounted outside said points and to which a second looping thread is fed for interengaging with the first looping thread, a pair of spaced bearings for said hood outside said points and anti-friction means between
130

said bearings to reciprocate and rotate said hook.

21. Looping mechanism for uniting looped fabrics by two interengaging threads comprising in combination a dial provided with a circular series of points, a head carrying said dial, means to rotate the dial, a needle mounted within the dial and to which a looping thread is fed, means to reciprocate said needle, an axially recessed spiral hook mounted outside said points and to which a second looping thread is fed for inter-

engaging with said first looping thread, a pair of spaced bearings for said hook outside said points and antifriction means between said bearings to operate said hook. 15

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

MAX KOEHLER.

Witnesses:

MAX NYDEGGER,
W. B. AUSTIN.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."